

Junius Henderson  
Field Notebook

No. 6

July 20, 1911 -

July 20, 1914

Also: Several  
pages of riveted  
typed notes

Field Note Book

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Rabbit Ear Camp, Colo.

Thursday, July 28, 1911.

Hinds and I started down the kuddy  
at 7:30 horseback.

Vesper sparrows common.

Saw red-tailed hawk.

No sparrow hawk seen up here.

Saw some on way up from Kremmberg.

Brewer blackbirds just south of  
Muddy Pass.

Brewer sparrows common here.

White-tailed jackrabbit, ears white with  
black tips.

Grout and Hinds independently report  
grouse with topknot. Look up sharp-tailed  
grouse. They say brown, larger than quail  
and smaller than dusky grouse.

Non-calcareous <sup>non-pellicular</sup> shales like Pierre in valley  
a mile or two N.W. of Whiteley Peak, dipping  
about east N.E.

N. 45° W. K. 13° W. from the peak is a good  
exposure of typical Fox Hills sandstone.

(I suspect Hygiene Pierre - see tomorrow's record)  
apparently conformable on the Pierre,  
but contact not seen. Dip  $20^{\circ}$  N.  $50^{\circ}$  E.

On N. side of creek where the road passes  
up over the hard sandstone I found a frag-  
ment of *Inoceramus* but broke it all to  
pieces. Also imperfect plant stem casts.

A little above and on the opposite side  
of creek got one *Mastra* cast.

Further up in shale on S. side of  
creek we found several *Marine shells* <sup>various pet.</sup>  
and *Bogubia* + *Inoceramus* at top of bluff <sup>100 ft above creek</sup>.  
Going up creek N. E. we reached the  
bluff visible for such a distance, N. of  
Whitely Peak. It is a <sup>very</sup> massive white sand-  
stone, partly oxidized to yellow in places,  
bedding planes seldom showing, containing many  
large iron concretions, weathering into cavities.  
Found *Halymerites major* half way up.  
Dip <sup>about</sup>  $10^{\circ}$  N.

Above the massive s.s. is thin bedded  
s.s. and shale, while <sup>near</sup> at the top is a coarse  
conglomerate, overlaid by an irregular s.s.  
containing numerous leaves, yet apparently  
nearly conformable on the massive s.s.

The area in here mapped at Uinta

lake beds by the Hayden survey is Montana and perhaps Colorado, certainly not Uinta.

This <sup>top of</sup> bluff is likely Laramie or Denver. Surely the massive sandstone with Halymenites is not later than Laramie, and it is not far beneath the conglomerate. Halymenites of course indicates marine or brackish water conditions, while the leaves above indicate land and fresh-water conditions.

On the return we crossed the Pierre or Fox Hills sandstone ridge further north, and to the west of it in the valley west and north of Bear Mt. We found typical Pierre concretions containing Baculites ovatus - calcareous concretions & traversed in every direction by calcite seams.

The thickness of the marine beds above the sandstone ridge and below the Laramie (including black fossiliferous shales) indicates that the sandstone where the road crosses it and the ridge extending northward may be the equivalent of the Hygiene sandstone.

Mostly clear, hot day.

Reached camp at 6:30.

Rabbit Ear Camp,  
Friday, July 21, 1911.

The Hayden Survey maps almost the whole valley east and southeast of Bear Mt. as Uinta Lake Beds (Tertiary) - several square miles, and map no Pierre or Fox Hills there. Yesterday our search failed to reveal any indication of Uinta or any other lake beds. On the contrary we found at almost every exposure <sup>up to the "Laramie"</sup> marine fossils of Moutana age, and the covering where rock in place was not exposed is the ordinary alluvium of the valleys and angular rock debris of the slopes.

The Hayden Survey also maps a large area from the bluff east as Laramie which may turn out to be Tertiary.

I spent the day in camp with an inflamed eye, which is better than last night. My sore lip, which has been very bad, is much better today.

Rocky Mt. Jays about camp.

Bright morning, but cloudy at 11 a.m. and began raining hard at

1 p.m.

Packed two boxes of fossils for shipment.

Rabbit Ear Camp

Saturday, July 23, 1911.

Eye better but stayed in camp all day on account of rain. East wind in morning, variable toward noon, westerly most of afternoon, raining at intervals throughout the day and beginning to clear toward evening.

Rabbit Ear Camp

Sunday, July 23, 1911.

Bright, breezy morning - west wind.

Hinds and I started down the Muddy at 8:30 a.m.

We examined a <sup>high</sup> terrace N. 75° W. from Whiteley's Peak, which is mapped as White Lake Peak by the Hayden Survey and found it to be typical Lower or Middle Pierre Shale containing *Baculites ovatus*, near junction of a creek from the north with Muddy. Dip very gentle, easterly or northeasterly.

(Swinging around to W. of Whiteley Peak)



along the road and then into pasture  
S. of road. we found a joint which contained  
thin bedded irregular, rather twisted sand  
stone like the upper "Hygiene" N. of the  
Peak.

Saw old antlers of big elk in gulch.  
Fine river terraces S. E. of Whiteley's  
Peak. Took a picture of them with  
stream meandering in foreground. also  
picture of Whiteley Peak from the west.

Montane sandstones S. of peak dip  
 $11^{\circ}$  N.  $18^{\circ}$  E. as measured by Hinds, at a point  
S.  $14^{\circ}$  W. of Whiteley Peak, where we found  
Baculites and *Lucina*?

S. of the Peak, between it and the creek,  
is a zone of typical Pierre calcareous  
concretions, seamed with calcite veins,  
containing *Baculites ovatus*.

At the N. bank of the Muddy, S. of  
Whiteley Peak, we found Pierre black  
shales well exposed, containing *Baculites*  
*ovatus*, *Quoceramus harabini* and *Scaphites*  
*usdonus*.

Reached camp at 5:30 p.m.

Violet green swallows at Muddy Pass.  
Lark sparrow W. of Whiteley Peak.

Hilldeers at Constantine Ranch, W. of  
Whiteley Peak.

Chickadees abundant in the  
sage brush mesas and bottom lands.

Oreobolus not seen on the Pierre  
formation.

Rabbit Ear Camp,

Monday, July 24, 1911.

Bright, crisp morning, with white frost.

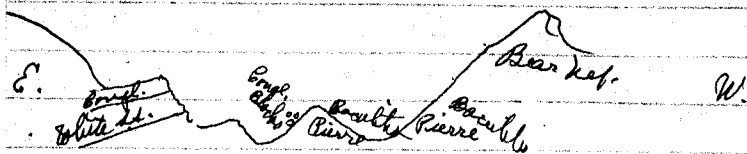
Hinks and I started east on horseback

at 8 a.m.

In valley E. and N.E. of Bear Mt. we ex-  
amined many of the calcite veined calcareous  
concretions in the Pierre <sup>shales</sup> and found only  
Baculites ovatus, which is the only common  
fossil of the formation in this region.

Packing over the ridge we found, across  
a gully S. of a new ranch house, large  
blocks of coarse conglomerate composed  
largely of well-worn quartz pebbles, probably  
residual from the weathering of the  
conglomerates mapped as Tertiary by

the Hayden Survey:



Conglomerates bear  $N. 8^{\circ} W.$  from Whiteky Peak, and  $N. 55^{\circ} E.$  from Bear Mt., and ~~from~~ conglomerate bluff where we worked a few days ago ~~to~~  $N. 53^{\circ} W.$ , and from rounded bluff next visited  $S. 51^{\circ} W.$

Next went  $N. 51^{\circ} E.$  to rounded bluff which bears  $N. 53^{\circ} E.$  from Bear Mt.,  $N.$  from Whiteky, and  $N. 20^{\circ} W.$  from Laramie(?) fossil bluff.

The round bluff exposes conglomerate and sandstone from half way up to the top, but no fossil horizon, and no white <sup>concretionary</sup> sandstone below the conglomerate. dip  $10^{\circ} N. 43^{\circ} E.$

Next went ~~to~~ <sup>to</sup> fossiliferous top of bluff which bears  $S. 70^{\circ} E.$  from Bear Mt.,  $N. 5^{\circ} E.$  from Whiteky's Peak and  $S. 16^{\circ} E.$  from rounded bluff mentioned in above paragraph. <sup>From</sup> conglomerate blocks  $S. 50^{\circ} E.$

Bedding planes irregular - no good leaves obtained.

Triangle doesn't check

5-3  
1-8  
070  
341

18  
70  
143

N. 5-3-3  
A. 18 E.

Large Area

Bear

Round hill of conglomerate

Rounded Bluff  
A. 18 E. N. 5/10 E.

N. 100 W

N. 100 W

3-5 W

A. 18 E  
Bluff

Bluff  
A. 18 E  
N. 100 W

Bluff  
A. 18 E  
N. 100 W

Bluff point - fossils

Started for camp at 3:30. Reached camp at 6:15 p.m.

The common ground squirrel in the valleys up to 8,000 ft looks like the one we took in Apal Basin.

Saw a poorwill near the fossil leaf outcrop.

Also a green-tailed Towhee, which I believe is somewhat common, as I have seen numbers of birds which can hardly be anything else.

The white-crowned sparrows seem all to be the variety with black lores.

I do not recognize specifically many of the plants, but find the following.

Aspens up to 2 ft in diameter at base  
Firs & spruces - No rock pines.

Balsam fir

Mariposa lilies with lavender tints

Eriogonum umbellatum (?) yellow

" straw-colored species

Gilia - long flowered one - ~~was~~ all red

Yarrow

Fraseria speciosa

Flax

Lonicera at 9,000 ft. & upward.  
or less

Potentilla fruticosa at 8,000 to 8,700 ft

Columbine still in blossom at 8,920 ft.

Sag tooth violet at 10,000 ft. or more.  
do not know which chickadee  
I hear in the woods.

a few dead Oreohelicon the conglomerate  
ate cliff.

### Rabbit Ear Camp.

Tuesday, July 21, 1911.

~~A~~ bloody morning, soon clearing.

Hinde and I started down the muddy  
on horseback at 7:50 a.m.

Passed through the Martin ranch, above  
Whitely Peak, and up the creek which  
comes in from the west.

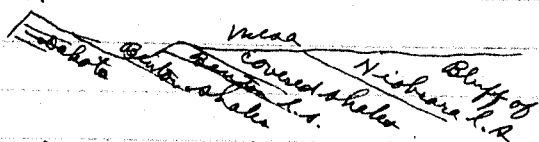
Found the usual fossiliferous limestone  
of the upper Benton, plenty of *Inoceramus*,  
*Oysters* and cephalopods, but hard to  
get out any good ones. Beneath this is a  
thick deposit of black shales, as at Boulder,  
and then the Dakota sandstone, all dipping  
gently easterly, the Benton limestone and  
Dakota each forming a west-facing  
escarpment.

Above this is a considerable thickness  
of calcareous shales as indicated

by the talus, passing upward into  
~~the~~ exposures of black calcareous  
shales, then into light, soft limestone  
which contains many *Ostrea congesta*  
or *Duocranus* fragments.

Large grouse in bottomlands here -  
a flock of 15 or 20.

W.



Dip 70 N. 50 E.

The light colored limestone <sup>and black shale</sup> form a  
west facing bluff as the creek swings north-  
ward, containing *Ostrea congesta* or *Duocranus*  
fragments from base to top. My  
impression is that the light color at the  
top is due to oxidation and that the  
whole is one formation of originally  
thin bedded limestone or highly cal-  
careous shale.

Down creek, east of the Martin  
Ranch road the bluffs are composed  
of somewhat calcareous black shales.

which look like Pierre, but we found no fossils. It is certainly above the *Ostrea congesta* horizon of the Niobrara.

Red-wing blackbirds here. <sup>Red-tailed hawk</sup> Nighthawk  
Reached camp at 5:20.

Rabbit Ear Camp,

Wednesday, July 26, 1911

Cloudy.

Broke camp at 7 a.m. and started down Griggly Creek into North Park with first wagon load of the outfit. Smith, Hinds and I accompanied the wagon on horseback. Camped about 8 miles N.  $85^{\circ}$  E. from Rabbit Ear Peak at 9:15 and sent the wagon back for another load. Then I started up creek horseback, ~~at a~~

where Rabbit Ears bear N  $85^{\circ}$  W. and Bear Mt. bears <sup>due</sup> S. ~~etc.~~ I found characteristic calcite stained concretions of Pierre formation but no fossils except a fish scale.

Mt. bluebirds abundant along telephone line far from trees. <sup>Swainson's</sup>  
Two hawks with black breast and

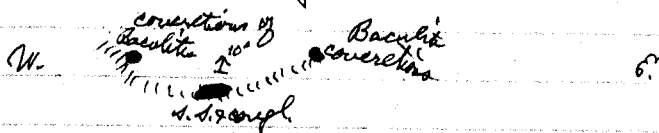


under side of wings white in front and black behind.

Wind blowing too hard for accurate compass observations.

about 200 yards further west is a bluff of coarse sandstone, somewhat conglomeratic in some horizons. Dip  $10^{\circ}$  N. <sup>(doubtful)</sup> It looks plainly like a stream deposit. F

all this is on north side of a gulch. around the bend just above I found a concretion containing Baculites.



Going N.W. in N. bank of next creek to the north, I found young Baculites. Rabbit ear - base  $8.34^{\circ}$  N., Bear pit  $8.70^{\circ}$  N.

At base of bluff were the usual calcareous concretions which had rolled down from above.

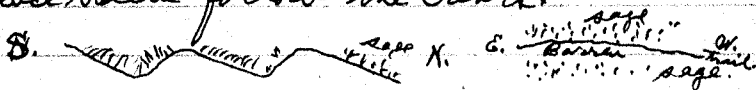
Dip slight, northerly - about  $8^{\circ}$  or  $10^{\circ}$ .

at top of bluff are sandstones and conglomerates.

Then came back to conglomerate first mentioned and found Baculites in the

concretions east of the exposure. Dip  $10^{\circ}$  E.

The divides and ravines in this ~~sage~~ vicinity are approximately east-west, the ravines having their ~~steeper~~ steeper side on the north. The space just at the crest of the divide is usually barren, while the slopes are thickly covered by ~~a~~ sage brush. Hence trails follow the crests.



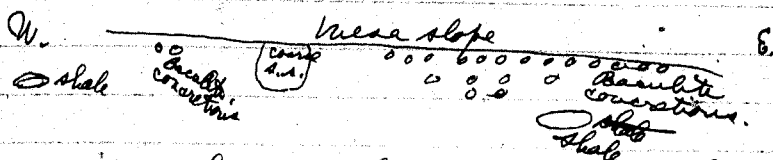
Seven crows here in a flock.

The stream deposit above mentioned is composed chiefly of quartz, bedding very irregular so that I am doubtful as to whether it dips at all. 200 yards from bluff to concretions to the west, possibly 400 to <sup>largest</sup> concretions on the east, 100 yards to the smallest.

The deposit may fill a post-Pierre valley. If the same as the "Laramie" of the Hayden Survey it indicates an erosion period.

It ~~and~~ has a tendency to weather into iron-stained concretions somewhat like those in the "Laramie" exposure #. West & east of Bear Mt. and also around an igneous point north of here which I visited this noon. Concretions east of this exposure occur all the way down

the slope, with shale exposed in the banks of the creek.



Saw horned larks and 2 sparrow hawks.  
Saw wagon coming with the other load,  
so I started for camp, reaching it at 4:25 p.m.

Four showers during the day, a very severe one just as we were making camp in late afternoon. *Griggs*

Thursday, July 27, 1911.  
Grizzly Creek camp.  
Clear & warm.  
We all rode up to the sandstone in the foot Pierre valley visited yesterday.  
The big basaltic concretion due north of Bear Mt.,  $S. 85^{\circ} E.$  of Rabbit Ears, dips  $14\frac{1}{4}^{\circ} N. 87^{\circ} E.$  (practically east). The sandstone-conglomerate is so cross-bedded that definite dips cannot be obtained, but certainly it does not dip anywhere near east. It is either nearly

horizontal or if it has any decided dip it is to the north.

Then Worcester, Hinds and I rode north to the young baculite outcrop of Pierre shale in N. bank of small creek S.  $84^{\circ}$  E. of Rabbit Ears, N.  $7^{\circ}$  W. of Bear Mt. Dip is  $22^{\circ}$  N.  $43^{\circ}$  E. The conglomerate above it did not show exposures in which dip could be measured. It is much weathered, but did not seem to have any such dip as the shale.

Worcester then left us and Hinds and I started in an easterly direction along the north side of this valley.

Fish bones common here in timber.

Perhaps 200 ft. east of where I left Worcester and about half way up the hill slope, black shales much broken have strong northerly dip.

about 300 to 400 yds. further are weathered fragments of brownish Pierre concretions containing young Baculites, oysters, etc. Traced such fragments, with occasional fresh shale about ~~equivalents~~, to a point about N.  $3^{\circ}$  W.

of Bear Mt., where <sup>the</sup> weathered s.s. and conglom-  
erate called by Hayden Survey Laramie is  
exposed at top of slope. Obtained no dips.

Proceeding up the valley of a large  
tributary of the Grizzly which comes  
in from the northwest, we found  
fragments of net-veined leaves in  
iron-stained sandstone concretions on a  
high hill on N.E. side of valley.

These leaves and the extreme irregu-  
larity of the bedding and crossbedding  
show river origin, I believe.

at a much lower horizon are exposed  
alternating sandy and clay strata, regularly  
<sup>thin</sup> bedded, dipping about N.E., just above mouth  
and on E. side of a ravine about 1/4 mile  
W. of Grizzly Placer, at mouth of gulch  
on W. side of ravine, in bank of old  
ditch, is irregularly bedded, coarser sand-  
stone.

at Grizzly Placer a pit exposes coarse  
gravel and beneath it clear clay.

Grizzly Placer is mostly on Tp. 5 N.  
R. 81 W. of 6<sup>th</sup> P.M.

Worcester says he saw 2 old and 2 young <sup>wild</sup> turkeys on east slope of Rabbit Ear yesterday.

Saw 4 sage grouse N. E. of Rabbit Ear today.

Bright in early forenoon. Cloudy and cool latter part of forenoon, with west wind and a number of sprinkles or showers, one at 4 p. m. with east wind.

Reached camp at 6 p. m. and found the old mare of the team badly mired, and the cook and driver unable to get her out, all hands turned out and got her out.

Grizzly Creek Camp,

Friday, July 28, 1911.

Cloudy morning, soon clearing, warm.

Hinds and I travelled east on horseback to a bluff some 6 or 7 miles away. It proves to be a <sup>very coarse</sup> igneous breccia probably at least 400 or 500 feet in depth, overlying a conglomerate not so coarse, quite regularly bedded, composed of ~~but~~ igneous pebbles but little worn. Reached camp at 5 p. m.

Griggly Creek camp.

Saturday, July 29, 1911.

Bright warm forenoon.

I started down Griggly Creek alone on horseback.

Heard a mourning dove

Lark sparrows rather common

Several magpies

White-tailed prairie dogs. Call very weak and rapidly repeated.

Basin or Arkansan glycatcher (one) - outer tail feathers white.

Several miles down, just after the road passes the corner of a pasture on the ~~to~~ west side, <sup>deciduous</sup> fossil leaves in the "Laramie" are abundant but the sandstone is so micaceous and splits so irregularly that I obtained none which are identifiable. Rabbit ears bears S. 55° W., Whiteley Peak S. 15-20. (is it S. 15° E?)

Half a mile <sup>or a mile</sup> ~~or so~~ further north is a fine exposure of regularly bedded shale and thin bedded sandstones.

alternating, in a bluff east of the Grizzly and west of the public road. Beyond this (north) is a bluff of whitish, rather coarse quartz sandstone, very micaceous with bright, probably secondary mica, and one or more harder brown bands. From a little distance it resembles Laramie. It appears to overlie the shale horizon.

Coal outcrop in a gully half a mile or so S.E. of a lake some distance N.W. of this outcrop. An incline shaft has been sunk in it.

On lake are many young and old grebes - some eared.

also killdeer and a snipe with bill about  $1\frac{1}{2}$  inch, white stripe over or through the eye, about size of killdeer.

also redwings. Saw redwings on muddy creek last Monday Sunday.

*Lymnaea palustris* common - fair sized.

Have seen no *Oreohelix* since we left the Colorado shales.

Coal mine about 2 miles N.E. of lake.

The cap stone of the terraces here



is a ferruginous sandstone layer, shale and coal below this.

Violet-green and cliff swallows abundant along the telephone wires.

North Park is well marked off from surrounding region by a wall of encircling mountains, and is more conspicuously a <sup>single</sup> mountain park - a topographic unit - than Middle Park. The greater portion is <sup>an</sup> arid sage-brush region of "mesas" (~~some~~ stream terraces), low ridges and divides. The ~~of~~ valleys of the streams are flat, but the aggradation has usually not been great, <sup>where examined by us</sup> as shown by rock exposures in the stream beds in places. The streams nearly all show beautiful meanders as soon as they emerge from the mountains and reach the ~~the~~ flatter country. The valleys form good hay land and should be good for the production of potatoes and other crops which will thrive at an altitude of

7,000 - 8,000 ft., where nights are cold and the growing season short. Streams are clear except where too many cattle range, and trout abound - <sup>the</sup> native species on the higher streams, introduced species said to exclude the native in the lower waters.

The mountains are well forested with various conifers adapted to high altitudes (have seen no rock pines) and aspens up to a diameter sometimes of two feet or more. The latter often constitute separate groves, though also freely intermingling with pines. On lower ground down to the lowest point visited by me (probably 8,500 ft. or less, groves of conifers and of aspens occur, especially, though not exclusively, on north slopes.

at the Rabbit Ear camp it was noticed that the water in the small creek did not change level even a <sup>noticeably</sup> fraction of an inch <sup>or become at all muddy</sup> with alternating dry weather and terrific downpours of rain, due undoubtedly to rank covering of vegetation and soil at that altitude and

upwards, which regulate the run-off.  
Under similar conditions, <sup>small, short</sup> streams  
in the drier foothills of north central  
Colorado would have shown great  
fluctuation, with very muddy water  
after heavy rains.

### Griggly Creek Camp

Sunday, July 30, 1911.

Bright, warm morning, cooler, cloudy,  
with a little rain in afternoon.

Spent the day about camp, did a  
little washing, took a bath, read, etc. In  
evening collected some land snails. Found  
*Oreohelix cooperi* alive, but no adults.

*Junco caniceps* common here, as at  
Rabbit Ear camp.

Woodchuck now calling close to camp.  
Saw a buffalo <sup>skull</sup> at a cabin yesterday.

Grizzly Creek Camp.

Monday, July 31, 1911.

Clear, cold morning, heavy frost.

Hinds and I started down creek at 7:45 horseback.

Saw 4 red-tailed hawks at one time, besides several others. Also another of the hawks with black throat, etc., white in front on under surface of wings and black behind. (Missouri)

Found abundant leaves in the shales examined Saturday, poorly preserved.

Visited a shallow alkaline lake N. E. of this exposure, <sup>E. of public road,</sup> evidently of aeolian origin. An artificial dam has been constructed to increase its capacity, but water level is now below the artificial outlet, though the lake has at one time been several (perhaps three) feet deeper as shown by the vegetation. Found dead *Lymnaea*, *Physa* and *Succinea* (?) on the shore, but none alive and dead shells not numerous.

Reached camp at 5:15.

Grizzly Creek Camp

Tuesday, Aug. 1, 1911.

Partly cloudy. Ice on wash basin at camp.

I left camp for Steamboat Springs on horseback at 7:40 a.m.

Saw 4 sparrow hawk, one red-tail and one of the hawk with black chin before getting out of the Park. Several dusky grouse.

Reached old camp S. of Rabbit Ears at 10:00; crossed divide from North Park into Grand River drainage at 10:30 and 18 minutes later passed into the Yampa drainage.

Stopped at 12 noon for lunch and to feed the horse.

Rained at 1:30 and threatened all afternoon.

About half way down the big hill into the Yampa, which took over an hour to negotiate, scrub oaks and Arctostaphylos (service berries) appeared and at Steamboat Springs narrow leaved cottonwoods and Populus

Sparrow hawks abundant in the Gampa Valley above the town. Saw a dozen at one time.

Meadowlark common.

Only 4 magpies seen.

Collected large *Physa* in slough.

Took the horse, which is the one Smith has been riding, to the Blwin-ington stable, where it belongs, and got a room for myself at the Ouzy Hotel.

Paid 18¢ postage and registry stamp on vouchers sent by Worcester to Miss Jones.

Moffat depot 6,680 ft.

Steamboat Springs, Col.

Wednesday, Aug 2, 1911

Started up river horseback at 7:50 a. m., but only went about a mile, when I became hopelessly entangled in a bunch of mollusks and spent most of forenoon in collecting them.

*Arcocheilus cooperi*, the most robust specimens I have seen except perhaps one lot, occur in great numbers near the

base of the slope of the west side of the valley, the river here flowing northerly. They also occur <sup>all along</sup> further up the slope, as far as I went. A limestone in the "red beds" outcrops far up the slope to the southwest, which likely provides the lime which seems necessary to the abundance of *Orcohelix*. The oaks, as well as the conifers, here, as elsewhere in western Colorado where I have been, seem unfavorable for *Orcohelix*, and even the aspen groves, where small species such as *Tonitoides*, *Pyramidula*, *Pupilla*, etc., seldom or contain colonies of *Orcohelix* of any importance. altitude at base of slope ~~7000~~ <sup>7000</sup> feet. The finest lot <sup>was</sup> found on a <sup>steep</sup> ~~rocky~~ <sup>east facing</sup> slope in a small narrow-leaved cottonwood grove, under the bushes of various kinds, including sage brush and many <sup>wild</sup> rose bushes. They were not much concealed and live ones were nearly as ~~well~~ easily found as dead shells. Collected a large lot, fre-

quently several live ones under one small bush.

Numerous very large *Physa gyrina*?; the finest lot I ever saw in point of average size, in a slough opening into the river at a little higher stage of water.

A single very large <sup>dead</sup> *Planorbis trivolvis*; I think the largest I have seen in Colorado, was found here, but nearly destroyed accidentally. I searched for ~~out~~ others without success.

Immense numbers of *Buccinea* sp. occurred on sticks, grass and mud near the water's edge. I collected a lot.

Obtained a few *Sphaerium* sp. in the shallow water of the river at the mouth of the slough, and dead ones on the muddy bank.

Reached hotel at 12:15.

Before returning I went up slope about half way.

Red beds like the Lophins are well exposed some distance up, and include much some sandstone and limestone. It is probably this limestone which has been quarried.



above this is a sandstone which may be Morrison. It is designated Jurassic on the Hayden map.

Above <sup>is</sup> the Dakota sandstone crowning the slope. It has been quarried somewhat, and across the river is now being crushed by the town and used in macadamizing the <sup>principal</sup> street.

At 1:45 p.m. I started down river on ~~west~~ <sup>south</sup> side below opposite the town below where the river turns west.

Bank of shale I at first took for Morrison, but thinness of Dakota sandstone above it makes me think it is <sup>the</sup> middle member of the "Dakota."

Dip is about  $60^{\circ}$  or  $70^{\circ}$  - did not measure.

A few hundred yards west shales are exposed which are probably Benton, with lower dip.

Half or three quarters of a mile further west the road and river cuts Benton shale, dipping  $30^{\circ}$  westerly. One highly fossiliferous band yielded nothing recognizable. Reminded me

somewhat of the persistent fossiliferous horizon in the Benton at Rabbit Ears and southward.

From the Morrison or Dakota shales and west of them sulphur springs issue - one a large one.

Forded the river and found Colorado shales capped by a light colored, shaly limestone containing Ostrea congesta or Inoceramus, capping the mesa, as on Muddy Creek.

Here I found abundant Oreohelix cooperi and depressa, the former predominating. Found some of each alive. It is a hot, dry, southfacing terrace and the live ones were mostly well concealed and hard to find, unlike the colony visited this morning.

A few hundred yards further west in a similar situation I found depressa abundant (dead shells) with only a few cooperi. Found no live ones of either species, but did not search much.

Reached hotel shortly after 3 p.m. and began caring for the collections.



## Expenses.

alcohol - Museum (+ hydrochloric ac)	-1.00
<sup>aug</sup> 1 <sup>st</sup> stamps and registry fee - survey	.18
aug. 2, saddle horse - survey	1.50
" " Mason jars	.10
" " cotton	.10
" " Packing boxes } Museum	.15
" " vaseline	.10
" 3 - Hotel bill.	3.50
" " Baggage transfer	.25
" 5, Hotel <sup>5</sup> meals <sup>1<sup>th</sup></sup> room 2 nights <sup>1<sup>00</sup></sup> saddle horse <sup>1<sup>00</sup></sup> transfer	4.75
" 7. Hotel, room 2 nights, 5 meals	3.50
" 9 " 2 days, + transfer of baggage	4.50
" " <sup>Denver</sup> Baggage transfer <del>suburban</del> <sup>Spencer</sup>	.50
" " Fare Denver - Boulder	.90
" " Baggage transfer at Boulder	.50
9 days service	36.00



Steamboat Springs, Col.

Thursday, Aug. 3, 1911.

Up at 6 a. m. Bright and cold. Frost.

Started for Mc Coy on train at 8:30 a. m.

Killdeer and robin common

Brewer Blackbird & cowbird

Kingfisher 1. Saw  $\frac{1}{2}$  in <sup>North</sup> Park.

Coal mines N. of Routt and at

Routt - sandstones and shales noted.

In railroad cut just as we left Routt

it looked like a thin bedded sandstone

just over a coal seam, very much in

appearance as the rock which breaks

so irregularly, with the fossil leaves, in

North Park. A little further along are

regularly bedded shale and sandstone

beds alternating some sandstone strata

nearly a foot thick, dipping N. <sup>W.</sup> about

25° or 30° and still further thin bedded

shales same dip.

In approaching Mc Coy fine contact

of sandstone and granite is seen.

Many cedars here.

Mc Bay, Colo. Thursday,  
Aug. 3, 1911.

Reached here the station, far up the mountain side at 18:30, 5 minutes late. As there was no one at the station I shouldered my pack, two bags and a bundle consisting of sliker, boots and canteen and walked to the Mc Bay Hotel in the canyon, taking the cutoff trail, a walk of 25 minutes down hill.

Piñons and cedars here.

Most of the trail was over lava and granite debris until near bottom of canyon, where I found sandstone and conglomerate. There are extensive exposures of sedimentary rocks, here, mostly red.

Barometer (aneroid) reads 6800 ft. Railway time card gives 7210 as the altitude of the station.

Collected *Agrioniax campestris* at hotel.  
at 12:30 I started on foot. Crossed to

254  
90  
65

W. side of creek at hotel.

Here <sup>400 or 500 ft. of</sup> fossiliferous <sup>gray</sup> limestones, and sandstones, probably carboniferous, dip  $60^{\circ}$  N.  $65^{\circ}$  W. Station 1.

Apparently conformably above this is a like amount of red conglomerate and sandstone. In the gully which cuts into this conglomerate are <sup>large</sup> ~~short~~ <sup>the clasts do</sup> nodules with fossils, lying loose as at Box Elder. Found none in place. Station 2.

Above this is a very fossiliferous limestone, best specimens weathered out. Sta. 3.

All the above are conformable, so far as I see.

Conformably above this are hundreds of feet of red conglomerate, with at least 2 limestone bands in the lower part.

Among the cedars and pines, at 7,200 ft. <sup>our red conglomerate,</sup> are hundreds of dwarf *Arceuthobium*. I got a bottle of live ones, the majority under a small pine log and the cones accumulated about it, the balance one or two at a time under cedar logs. <sup>There are lime bands in portions of the conglomerate.</sup> One dead adult mineral specimen.

At 4 p.m. I turned back, not having yet gotten out of the red conglomerate.

Changes of dip and strike spread it out over a large territory.

Station No. 1 appears to be the Middle Carboniferous and stations 2 and 3 the Upper Carboniferous of the Hayden map.

Principal trees along the bottomland here are narrow-leaved cottonwoods.

Mesas among the cedars and pinyons are quite barren. Sage brush in some places. Much easier to get around than among the ~~forests~~<sup>conifers</sup> and aspens at Rabbit Ear camp, Steamboat Springs, etc.

Mc Bay is on the old main freighting road from Wolcott to Gampa, Steamboat Springs, etc., and was once lively, the hotel, <sup>and stables</sup> often housing ~~40 to 60~~<sup>75-125</sup> people. Now it is a very quiet ranch-house. I seem to be the only guest, but there are quite a number of people about who are evidently connected with the ranch, store and postoffice. I think it is a sort of family affair. ~~Last night~~<sup>Tonight</sup> a man and woman who have been in the Klondike but line at Eagle drove in with an eight dog team hitched to a small wagon, with a sled on top



and a lot of extra dogs, and camped on the creek, pulling out in the morning.

McBay, Colo. Friday  
Aug. 4, 1911.

Partly cloudy morning.

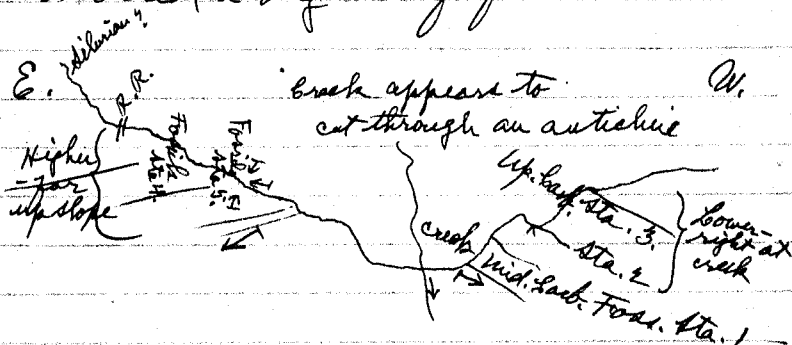
at 8 a.m. I rode east over barboiferous sandstones.

saw no *Orchelimum* until I reached ~~sand~~<sup>lime-</sup>stone east of railway, where I found the same dwarf form noted yesterday west of the creek.

West of railway is a fine anticline of metamorphosed sandstone and conglomerate with a gulch cutting into it along the apex. This is the area mapped as Silurian by the Hayden Survey. In the upper part is one (or more) limestone bands. Where the railway cuts through is a very coarse conglomerate and deep red and light-colored sandstones alternate. The red is very micaceous. Dip <sup>does</sup> northerly at high angle.

about 400 or 500 yards W. of railway is a fossiliferous carboniferous limestone. Am not sure whether Lower Carboniferous. Station 4. Collected some fossils.

Down the slope to the west, toward the creek, in a syncline, is another fossiliferous limestone. Station 5. Collected a big lot of fossils.



Below the fossil station No. 5 is a thick conglomerate extending nearly to creek, probably Hayden's Lower Carboniferous. Found no fossils.

Near creek, below hotel, is a remnant of fairly consolidated boulder deposit, probably Pleistocene.

Collected *Physa* from a small pond surrounding a spring and *Lymnaea* from a ditch.

The limestone at station 5 was a thin *Productus* band, grading below into

calcareous shales. I believe the gasteropods and pelecypods weathered out on the surface, and possibly the spirifers, were from the shaley portion. The Productus extended down into this portion.

Very hot afternoon in gulches

Mc Bay, Colo. Saturday,  
(+ Krummbing in P.M.) Aug. 5, 1911.

cool morning, bright, sun soon getting hot.

Started to the station with my load in a buckboard at 9:30 - reached station at 10:20. Difference in altitude 600 feet, distance by road probably a little over 2 miles.

Got train at 10:30 - 5 minutes late.

Passed through red barboiferous from Mc Bay nearly all the way to Steh Bridge, where a fine contact of a lava flow capping limestone & redbeds may be seen. Country all barren except for piñons, cedars and sage brush.

above ~~low~~ state bridge formations mostly covered, with scattered exposures of Red Beds, shales and igneous rocks, finally reaching Morrison overlying Lyellia, apparently, at Radium.

Reached Kremmling at 11:50, on time.

In afternoon collected mollusks, beetles and small frogs or toads near the sloughs.

The Batrachians were found under logs from 10 to 200 ft. from the sloughs.

Succinea grosveneri and Succinea sp. alive were found abundantly on the mud from 1 to 10 ft. from the water, more in the open sun than in the shade of the grass and weeds with both species.

Collected several large Physas and one big Lymnaea, Planorbis parvus, Planorbis exacrus, and 2 dead Sphaerium sp.

Delightful cool breeze this afternoon.

Like the White River Valley and portions of the region east of the Front Range, we find in North Park, ~~and~~ on Bear River, on the Muddy and on Grand River, fine terraces marking one or more ceasa-

tions from and renewals of down cutting.

Krummliug, Colo., Sunday

Aug. 6, 1911.

Bright, cool morning, soon warming.

The bluffs west of town mapped as Uinta by Marvine (Hayden Survey) are Pierre. Along the slopes are the usual calcareous concretions containing *Baculites*, *Duoceraurus*, etc. The whole exposure is very sandy, rather thin bedded.

At the top of the bluff is a harder sandstone which preserves the bluff and to the north are several persistent limestones which form minor terraces, containing many *Baculites* oysters, one *Scaaphite* fragment and a few *Duoceraurus* fragments.

Followed this horizon down <sup>north</sup> by way of a gulch to where it crosses muddy creek.

Here I found in loose gravel many *Sphaerium* sp. *Succinea* spp.

a few *Lygnumae palustris*, *Planorbis*  
*epicrura*, one *Planorbis parvus* and  
one *Physa* sp. searched the creek for  
*Sphaerium* but found none alive.  
They occurred only in the gravel not  
in the mud banks. Perhaps washed  
for some distance.

Country barren except for not  
very heavy growth of sage brush.  
a few small deciduous trees along  
the creek bottom and a few conifers  
and cedars <sup>and cedars</sup>  
on higher points.

Crossed creek and proceeded  
E. of N. to top of low ridge capped  
with rather hard sandstone, but ~~is~~  
weathered - no section seen.

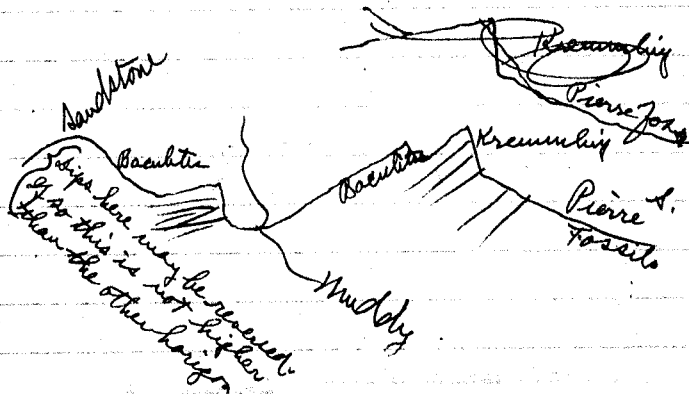
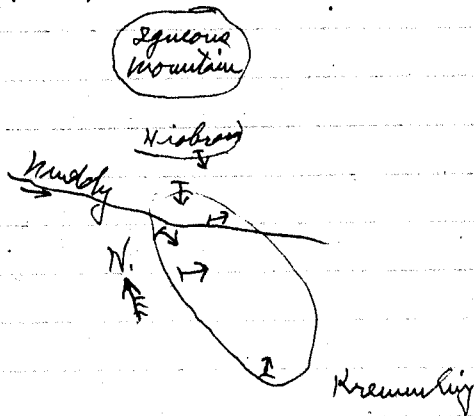
Just below the sandstone, at a  
horizon <sup>geographically</sup> 235 feet higher than the one  
I followed down to the creek, are  
Baculite concretions again. <sup>size may be re-  
duced. If so they  
is not as high  
as Griffith.</sup>

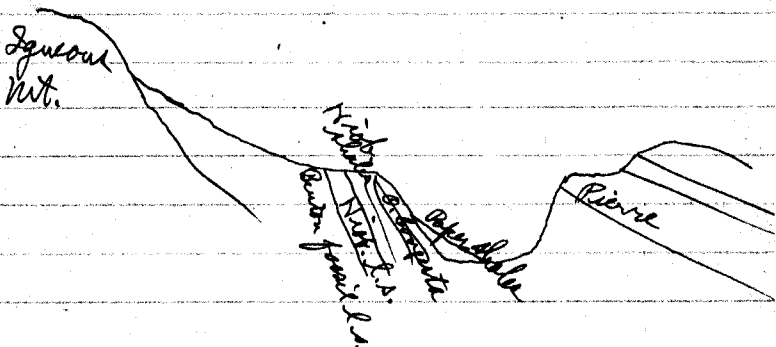
all this is mapped as Uinta by Marvine  
(Hayden Survey).

*Lygnumae palustris* of fair size abun-  
dant in a <sup>shallow</sup> slough (grass-grown) 50 x 100 ft.  
in Muddy Creek Valley.

as I approached the igneous mountains

to the north the dips changed so as to dip away from the Mountain and expose Niobrara dipping very steeply, in places vertical or even overturned. ~~The~~ Well up the slope is typical <sup>massing</sup> Niobrara basal limestone, overlaid by paper shales.





Underlying the massive limestone is the fossiliferous thin bedded Benton limestone, weathering brown.

A short distance above the massive limestone is the thin bedded *Ostrea congesta* limestone, and above this the paper shales.

did not find dividing line between Niobrara and Pierre.

Hard wind all day prevented such heat as at McCoy.

No *Oriskany* on the south-facing Niobrara and Benton slopes at base of mountain. On trip out a month ago I found *O. cooperi* abundant on north-facing slope on opposite side of creek 2 or 3 miles further up.



Kremmling, Colo., Monday.

Aug. 7, 1911.

Bright morning, warmer than yesterday, calm. Breezed up about 11:30 a.m.

I carried my heavy bedroll, heavy suit-case, camp pack and small collecting bag to the depot, in two loads, and the box of Steamboat Springs and McCoy fossils I carried to the livery barn, where the other collections are stored.

Left Kremmling at 11:54.

Sulphur Springs, Colo.

Aug. 7, 1911.

Reached here 12:35 p.m. Went to Park Hotel.

After dinner I walked east on S. side of river.

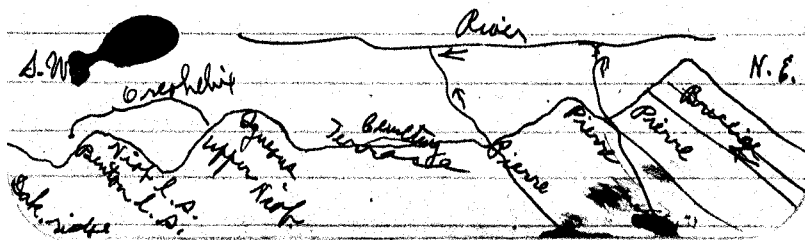
Just west of the ridge called *Soleritis* Breccia on the Hayden map, <sup>(andesitic Breccia, according to Wood)</sup> is a valley, then a <sup>low</sup> ridge, on both sides of river. The ridge seems to be Pierre, though I found no fossils in the lime concretions or bands. Both *Soleritis* Breccia and <sup>underlying</sup> Pierre dip at a rather high angle eastward or northward.

In the valley west of the low Pierre ridge in the creek bank are sandy shales probably of Pierre age, dipping  $30^\circ$  easterly or northeasterly.

Then passing S.W. over the sloping, gravelly, sage covered terrace and around the northern end of an igneous ridge, I fail to find any suggestion of the Uinta mapped by Merwine. Do not see upon what he could have based his inference.

On west slope of the igneous tongue are light colored calcareous shales. I found a few oyster fragments. My attention was first drawn to the calcareous nature of the soil by numerous dead *Oreohelix*.

light. Across a valley to the west is massive gray Niobrara limestone, immediately underlain by the Benton fossiliferous limestone which weathers brown. *Oreohelix* here also.



The "Dakota" ridge is covered by a dense growth of conifers and aspens. No *Oreohelix* on "Dakota" sandstone slopes. Examined an aspen grove for mollusks and found only 2 dead *Vitrima alaskae*.

Sulphur Springs, Colo.  
Tuesday, Aug. 8, 1911.

Bright, cool morning.

Started on foot with camp pack on my back at 7:30 for top of Mt. Cross.

Set aneroid at 9665 at depot.

Collected fossil leaves in <sup>white</sup> tuff in the talus and found the material in place at an altitude of <sup>about</sup> 8000 ft.

Reached top of Mt. Cross at 9:45.

Aneroid here reads 9200 ft, making it 1535 ft. above the depot, which is perhaps 1000 ft. above river water level.

Formation entirely sedimentary, but consisting chiefly of volcanic material.

On return I collected *Leymnaea* and *Physa* from warm stream just

below the ~~mountain~~ <sup>hot sulphur</sup> spring which issues from the bath house. Physas were in the warm water, Lymnaea in cooler water at edge of pool. Physas mostly small.

Then collected Physas in slough on S. side of river and up-stream, where they are mostly of good size. Also one or two Lymnaea and one leech.

On muddy bank of slough collected a fine lot of Sphaerium.

High wind, most of day, while not a cool wind, prevented excessive heat on exposed ridges.

Brought down from the mountain the big camp pack full of fossils, a very heavy load for a 135-pound man.

Sulphur Springs, Colo.  
~~Wednesday~~  
Thursday Aug. 9, 1911.

Bright, cool morning - soon warming up. Cedars and pines sparingly on Mt. Brown. No English sparrows here. Saw 4 at hotel.

Landlord says they arrived two years ago.



## Resorts

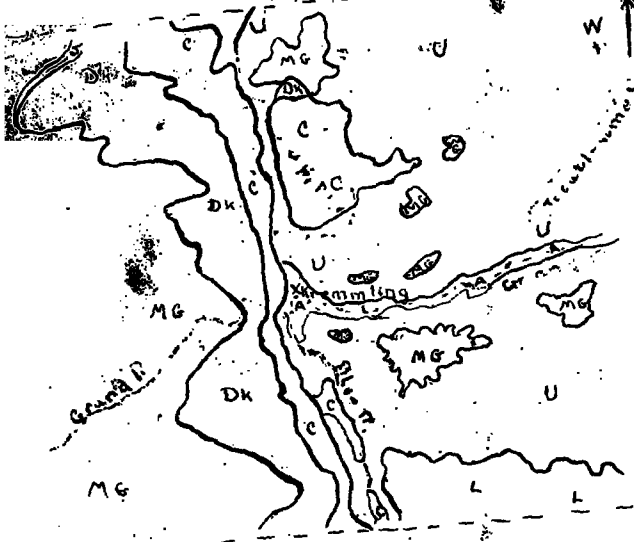


The building of the Denver, Northwestern and Pacific Railway has opened many new resorts within easy reach of Denver. Sulphur Springs, the county seat of Grand County, has long been famed for its hot mineral water baths and the remarkable curative properties of the waters.

Grand Lake, one of Colorado's most noted resorts, is now within a day's ride from Denver by rail and stage. Connection is made with stage at Steamboat Springs for all points in Routt County as far west as Craig.

Steamboat Springs is destined to become America's most famous health giving resort, and at the present time many tourists annually spend their summers there, enjoying the baths and hunting and fishing in the immediate vicinity.

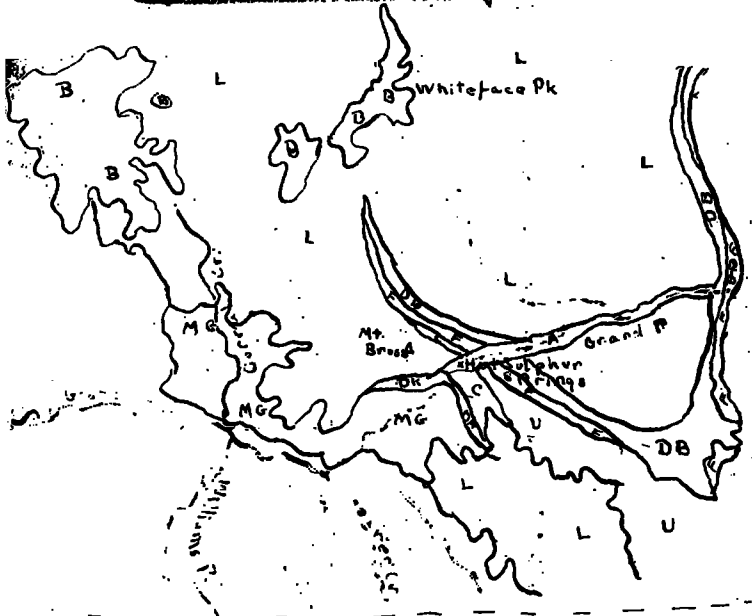
# Flora Hayden Survey



- A- Alluvium
- L- Laramie
- C- Colorado
- Dk- Dakota
- J- Jurassic
- MG- Metamorphic Granite

Region about Kremmling  
 Scale 4mi = 1cm

# Hayden Survey:

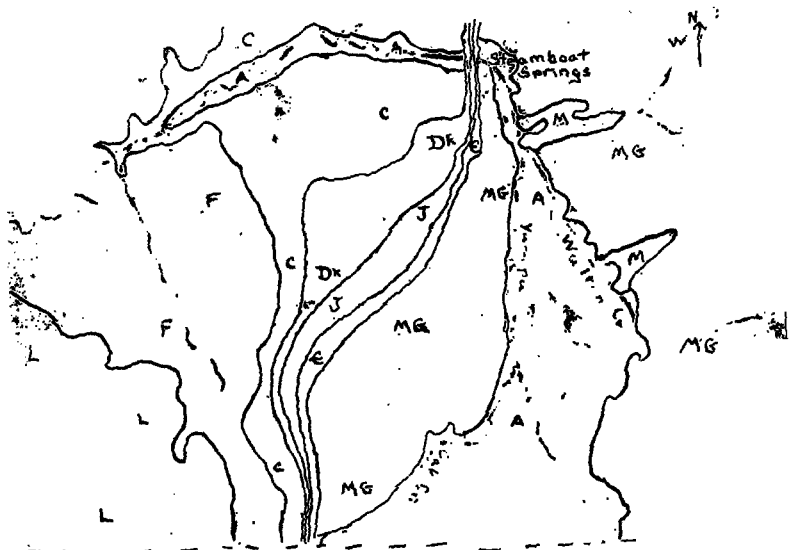


- |     |                      |
|-----|----------------------|
| A-  | Alluvium             |
| B-  | Basalt               |
| DB- | Doleritic Breccia    |
| C-  | Laramie              |
| U-  | Fox Hills and Pierre |
| DK  | Colorado Dakota      |
| MG  | Metamorphic Granite  |

Region about Hot Sulphur Springs.

Scale 1 in = 4 mi





- A Alluvium
- M Moraines
- L Laramie
- F Fox Hills and Pierre
- C Colorado
- DK Dakota
- J Jurassic
- E Carboniferous (Hayden's Triassic)
- MG Metamorphic Granite

Region about Steamboat Springs  
 Scale 4 mi. = 1 inch

Hayden Survey

Expense to Huerfano Park.

Aug. 18,	Transfer to depot	.30
" "	2 fares Boulder - Denver	1.80
" "	Dinner Lunch for 2 - 1 <sup>43</sup> tip 10 <sup>a</sup>	1.55
" 19	Room and breakfast Klein Hotel	2.00
" "	Lunch for two	.65
" 23	" " " "	.30
" 26	addie bastella, board & lodging	24.58
" "	March addington, feed & care of team	10.75
" "	John Murphy team & buggy 5 days	18.75
	Bar fare	20

Expense to Arapahoe Peak.

1911

Aug. 31.	Transfer to depot	.30
" "	2 fares roundtrip Boulder - Eldora	5.00
Sept 1.	2 saddle horses	5.00
" 2.	Board and room	4.50

Huerfano Park. Bull. 106 pp. 28-29.

Synclinal basin, Wet Mts. on east and north, Sangre de Cristo on W. and S.W.

Central part Eocene.

Cretaceous on margins, especially east, north + N.W. and west sides.

Dakota to Laramie, but Montana and Laramie not well exposed.

Fossils mostly in Pugnellus sandstone, at top of Benton shales.

Littoral fauna, 43 spp.

Fossils in thin bands of hard, calcareous sandstone.

Best places are near Lillian's Ranch on Williams creek.

On muddy bank 10 miles above Goshier, Poison Canyon,

near Nabokite on N. side of Huerfano River.

Persistent brown calcareous sandstone above the Pugnellus always contains shark teeth and usually impressions of *Prionocyclus wyomingensis*, and usually *Ostrea lugubris*. One to 4 ft. thick.

Section on muddy creek as follows. (See p. 30).

Sakota with plant remains not fully exposed 900  
Colorado. —————

Dark clay shales ————— 100

Gray l. s. in thin bands + shale, *D. labiatus* 30

Dark shale 300

Coarse gray + yellow s. s., very fossiliferous 40-50

Brown s. s., *O. congesta*, *P. pennsylvanica* + teeth 4

Sand l. s., *D. formica*, *D. labiatus*, *O. congesta*

passing up into calcareous shales 75

Colorado formation. Darton Prof Paper No. 32 p. 166

Lower Benton shales = Gravers shales <sup>1840</sup>

Medial " " l. s. = Greenhorn l. s.

Upper shale and s. s. = Carlile formation

Boulder, Colo., Aug. 18, 1911.

Hard thunder shower at 3 p. m.

Hot day.  
Nelly and I

Left on 4 p. m. train for Denver  
and took A. & R. Y. train at 6 p. m.  
for Walsenburg, arriving at 1:10 a. m.  
and going to Klein Hotel.

Walsenburg, Colo., Saturday,  
Aug. 19, 1911.

Bright, hot morning.

Saw Charles Hayden, who took me to  
the Palace Livery stable, where I got  
a team and buggy for \$2<sup>50</sup> per day.  
Started for Gardner at 9:44. Reached  
Huerfano river at Badito at 1:15, where we  
stayed until nearly 2:30. Reached Gardner  
at 4:30.

Barren, dry country, characterized  
by juniper, cedars and candelabra  
cactus all the way.

From Walsenburg to the river we  
passed over the coal formation. At the river  
we found ~~barbils~~ Colorado ~~strat~~ forma

tion well exposed on both sides of the anticline which forms the southern extremity at east of Badito Mt.

The Huerfano "river" cuts through into "sakota" sandstone with a few shale partings. To the north the upper formations are eroded from the ridge, leaving<sup>a</sup> deep red formation exposed above which is a light formation, as in case of the Lykins-Morrison contact north of Boulder, particularly at Loveland and Owl Canyon.

In the park at first we passed over a lot of Niobrara, then probably Montana and one outcrop of possible "Laramie".

The stream is fringed with narrow-leaved cottonwoods.

Gardner, Colo., Sunday  
Aug. 20, 1911.

Bright, warm morning.

Both narrow-leaved and broad-leaved cottonwoods occur here. A fine grove of the latter is dying at the upper end of the settlement, <sup>probably</sup> because the stream has recently cut its channel much deeper, so that the trees can no longer reach water.

Saw Buzzard yesterday.

Red-headed woodpeckers common here  
Saw mourning doves Meadowlarks

Barn swallows Flicker

A sharp butte probably 300 or 400 ft high about ~~E~~ S. 83° E. from <sup>to base of</sup> hotel does not show on topographic sheet.

Good rain in late afternoon.

We went to Epworth League in evening.

Gardner, Colo., Monday.  
Aug. 21, 1911.

Partly cloudy morning.

at 7:45 we started by train up

Williams Creek to the Guillan Ranch,  
which we reached at about 10 a.m.

Tertiary conglomerates <sup>and sandstones</sup> are well  
exposed on both sides of Williams  
Valley.

Two volcanic dykes cross the  
road within a mile or so <sup>north</sup> of the  
volcanic butte just east of town.

One is very narrow and barely  
shows above the level of the ground  
— can hardly be seen more than a  
hundred yards away.

At 11:45 we had a very hard rain.

We found an exposure of what I  
take to be the equivalent of Niobrara  
ls and shale, containing *O. congesta*  
on *Duoceramus*, and the *Pugnellus*  
s.s. with *I. labiatus*, *Ostrea* sp. and  
shark teeth, on W. side of creek and for  
1/4 mile to 1 mile N.W. of ~~the~~ Guillan  
Ranch house, also on east side of  
creek about half a mile S. or S.E. of  
the house, but found very few  
good fossils. Must have missed the



place to which Stanton refers:

started back at 3:30 p.m. and arrived at Gardner at 5:46. It rained most of the way back, and part of the time very hard, and the road was quite slippery.

at the <sup>2<sup>nd</sup></sup> Quillan ranch were the largest oaks I have seen in Colorado. Still raining steadily at bedtime.

Gardner, Colo., Tuesday,

dark and Aug. 22, 1911.

bold, cloudy all day. Rained until noon. Too rainy and muddy to go out today. I have had cold. Stayed in our room all day.

Gardner, Colo., Wednesday,

Aug. 23, 1911.

cloudy morning, partly clearing up and warming up by 8 a.m., when we started up the river.

at Malachite we turned south, crossed

the river at the Malachite Hotel and kept on south.

Where the road forks at a point about west of the pass between Little Sheep Mt. and Sheep Mt. we found the Colorado formation partly exposed.

Sheep Mts. are both igneous.

Several other smaller igneous dikes cut through here and one seems to have overturned the <sup>Highly ~~of~~ Cretaceous</sup> formations where our road crosses them, so as to make it appear as if the younger formations dip under the older, thus:

S. W.



N. E.

Found a few *Ostrea congesta* in the Niobrara, but collected none.

In limestone near top of Purgellus are many *Inoceramus labiatus*, casts of *Orionocylus wyomingensis*, etc.

Not far (a few feet) beneath this just west of our road at one point we found hundreds of gastropods in another limestone, mostly *Pugellus* probably. Followed the *Pugellus* <sup>sandstone</sup> around the head of the syncline to the northwest, but found no more gastropods, though the *Duoceramus* horizon was conspicuous all along the line of marsh, and reminds me forcibly of the similar horizon in North Park and at the Martin Ranch etc. at head of the Muddy, S. of the Rabbit Bars.

Started back at 3:30 and got into a thunder shower.

Saw the following birds:

Flicker 2

Mt. bluebird common

Brewer blackbird "

Barn swallow "

Killdeer 1 at Malachite

Burrowing owl 1 at Malachite

Hummingbird sp. common

Siskin common at Malachite

Violet green swallow " " "

Yellow warbler " " "

White-rumped shrike 2  
Ark. flycatcher (white outer tail feathers) <sup>common</sup>  
Marsh hawk 3  
Mourning Dove common  
Magpie "  
Meadowlark "  
Vesper sparrow "  
Pinon jay "  
Kingbird (*Tyrannus tyrannus*) 2  
Saw 3 kingfishers up Williams  
Creek Monday.

Gardner, Colo.

Thursday, Aug. 24, 1911.

Bright, cool morning.

We drove up Muddy Creek about ten miles, just below Meyer's Ranch, starting at 7:10 a. m., arriving there at 9 a. m.

The Pugnellus sandstone is in a sharp anticline N. E. of the creek. There are igneous dykes here, as elsewhere in the Park.

Obtained a fine lot of fossils from the Pugnellus sandstone and one

or two *Dioceraurus deforensis* from the overlying Niobrara limestone.

at 2 p.m. it began to rain, so we got in the buggy, drove up to the big ranch, where there are extensive exposures of the Colorado, then started back.

The storm down the Muddy and Huerfano, at least to Badito was terrific.

at 6 p.m. it began raining again at Gardner. Clear at bedtime.

Gardner, Colo., Friday  
Aug. 25, 1911.

cool, partly cloudy morning, clearing after noon. strong west wind.

Drove up to Malachite, then north to Poison Canyon and up the canyon to an exposure of Pugnellus sandstone on south side, about 12 miles by road from Gardner. Sandstone and Niobrara limestone slightly overturned. Obtained a fine lot of

fossils. Started back at 2:40  
p.m., arriving at hotel at 4:20.

Hotel run by Mrs. Dan Costello.

Whole country up here shows  
recent rapid erosion. The streams  
are entrenched in flatbottomed "can-  
yons" with vertical walls of  
alluvium from 10 to 30 feet high.

saw redwings, about 25 near Gardner

" lark buntings, 6 female or young " Malachite  
" 1 buzzard  
" 1 nighthawk 3 at Gardner

Gardner, Colo., Saturday  
Aug. 26, 1911.

Arranged with Charles Addison  
to ship the box of fossils for  
us.

Clear, bright, warm morning.

Left Walsenburg at 6:55, reached  
Walsenburg at 10:45 by the shorter  
road.

saw 1 sparrow hawk.

The prairie dogs in Heierfau  
are whitetailed. Those outside the park

are not.

Took 2 p. m. train at Walsenburg, changed cars at Bushara Junction and again at Pueblo, reaching Denver at 8:25 p. m., and caught 9 p. m. Interurban for Boulder.

### Arapahoe Trip.

Boulder, Colo., Thursday

Aug. 31, 1911.

Bright, warm morning. Nellie and I took 9:25 train for Eldora. Reached Eldora at 12:35, and dined at Mrs. Martin's "Home Sairy" restaurant, then went to her rooming house - the old Gold Mines Hotel. Collected fossils under logs in afternoon.

Blistering, sprinkling.

Eldora, Colo., Friday

Sept 1, 1911.

Hazy clouds in morning, not cold. Nellie and I started for top of peak.

Arapahoe glacier on horseback at  
7 a. m., via Baribon trail. Left horses  
on rim of canyon half mile from the  
"saddle". Reached the ice about noon.  
Foot of ice 12,300 ft. altitude, with  
aneroid set at 8,900 at Eldora. The  
saddle 12,800. Point where we left  
horses 13,000. Nellie had great diffi-  
culty in climbing the slide rock out  
of the cirque. Began to snow <sup>sleet and hail</sup> just  
before we got out, with heavy thunder.  
Got to horses and rode down to  
timber line, when the storm ceased  
and we built a fire at the first  
trees, made coffee and got warm.

Reached Eldora at 6:15 p. m.  
aneroid registered 8,900 on our return,  
and at bedtime.

Eldora, Colo., Saturday  
Sept. 2, 1911.

Slightly hazy, warm. aneroid still  
registers 8,900 so it was likely 200  
ft. high yesterday.



collected another bottle of small snails, about 10 or 12 species, in mixed, narrow leaved cottonwood, aspen and <sup>meadow</sup> conifer forest on moist ground in creek bottom near hotel.

Left Eldora on the 2 p. m. train, reaching Boulder at 4:35.

Stormed on Arapahoe Peak again this afternoon.

Boulder, Colo., Sunday,

June 9, 1912.

Cloudy, cool. Rained hard  
at 11 a. m. I left for Ft. Collins on the  
5:20 train. Reached " " at  
7:20 p. m. Spent evening with  
W. W. Robbins and wife.  
Clear at bedtime.

# Northern & N.E. Colo. Expense

FF

1912.

June 9,	A. A. Baumeyer, Trefise livery,	2.5
10	Northern Hotel, Ft. Collins	1.50
"	stage to Livermore (Zimmerman)	2.00
13.	G. E. Breuere, board, <sup>3.00</sup> room & livery <sup>10.00</sup>	13.25
14.	John R. Basson, Wellington, livery	5.00
15.	J. M. Emge " board & room	3.00
16.	G. J. Sawyer, Windsor, board & room Butter & self	4.00
17.	Campfield Hotel, Greeley " " " " " "	3.50

Ft. Collins, Col., Monday

June 10, 1912.

Bright morning, up at 6 a. m.

Took Zimmerman auto-stage for  
 Livermore at 7:30<sup>a. m.</sup> Got out of town  
 at 7:45<sup>a. m.</sup> Reached Livermore, 24 miles  
 distant, at 9:30 a. m.

Ed. Greenacre met me at Livermore  
 with an auto. Reached Greenacre ranch  
 at 11:15; 10 miles distant by road.

Butters met us about a mile  
 from the ranch.

In afternoon Butters and I started  
 down the creek. Just below the ranch we  
 found in a small slough *Lymnaea*  
 *asperata*, *Planorbis perovis* and *Physa*  
 sp. (only dead *Physa*) and under a log  
 two specimens of *Agricolina caespitica*  
 (nearly black, perhaps var. *montana*).

Went down below the schoolhouse  
 to where the road crosses the Morrison,  
 where Crawford found *Valvata* sp.  
 several years ago. Here we found,  
 in the base of the Morrison,

fresh-water algae (undescribed) the same as I found further north several years ago.

The yellow sandstone in which the Hayden survey reports *Pentacrinus asteriscus* is unmistakable, just below the hard basal Morrison limestone. Hence there is here no sandstone in the lower Morrison, <sup>if the yellow s. s. is really marine.</sup> The marine Jurassic (Sundance) is here quite yellowish, evenly bedded at the top, <sup>(several feet)</sup> and approximately conformable, so far as I could observe, with the overlying Morrison limestone. Beneath the yellowish s. s. is a yellowish-pinkish series perhaps 20 ft. or more (a mere guess) in thickness, in places very strongly crossbedded, resting on very red Lyons. The Sundance makes a nearly vertical cliff, with the Morrison sloping away above, <sup>and capped by quartz</sup> and the Lyons below.

Returned to ranch at 4:30 p. m.  
more complete geology record in field survey notebook for study.



Greenacre Ranch, Wednesday  
June 12, 1912.

Clear, calm morning, partly cloudy  
most of day, sprinkling at intervals  
during afternoon.

We drove down to the plains, then  
south to the foothills, then climbed on  
foot over the "Dakota" ridge and searched  
the Morrison formation for fossils, but only  
found an undescribed alga. Returned to  
ranch at 3 p. m.

Greenacre Ranch, Thursday,  
+ Wellington June 13, 1911.

Started at 8:05 a.m. in auto, reached  
Wellington 18½ miles distant, at 9:25 a.m.

Got rooms at hotel, hired a horse  
and buggy and drove N. E.

Saw 3 whitetailed jackrabbits

" several horned lizards, collected one  
also took a small, striped lizard new to me.

Bright morning, partly cloudy <sup>most</sup> part of day,  
warm and very windy.

Geological notes in Geol. Surv. notebook

Wellington, Colo., Friday

June 14, 1912.

Drove North and East, returning  
at 5:30 p.m. Cloudy, cool and windy.

Wellington, Colo., Saturday,

June 15, 1912.

Cloudy morning, beginning to rain  
at 7 a.m. Took 8:25 a.m. train for  
Ft. Collins. Miss Hames, school-teacher  
at Grover, was on the train. Got a  
train out of Ft. Collins at 9:15 for  
Windsor, where we went to American  
Hotel. Quit raining at noon, so we  
drove over south of the river, re-  
turning at 4:30. I got considerably  
chilled in spite of wearing my  
sliker, and built a fire in our  
room upon returning.

Cleared up before dark.



Windsor, Colo., Sunday.

June 16, 1912.

Cool, cloudy morning.

We drove across river S.E. of town in morning. Heard mockingbirds and crows. Saw two brown thrushes. Many great blue herons, crows, redwing and yellow-headed blackbirds, vesper sparrow, lark sparrows, meadowlarks, magpies.

sprinkled at intervals, rained most of latter part of afternoon.

Took 7:50 p.m. train for Greeley. Went to Confield Hotel.

Raining hard at bedtime.

Greeley, Colo. Monday

June 17, 1912.

Rained hard all night, still raining at 7:15 when we took the train for Platteville. Rain continued all day, cold, so we spent day working on our report.

Clear at bedtime.

Platteville, Colo., Tuesday,

June 18, 1912.

Clear, bright, warmer. Heavy snow on mountains, white to below timber line.

Drove east then north, then back, about ~~25~~ 35 miles. Collected 2 species of small lizards near Box Eedes Creek.

Platteville, Colo., Wednesday,

June 19, 1912.

Clear, hot. Drove west and north to Wildcat Mound. Collected *Lygumnaca caperata*, which is common in the sloughs along the Platte and St. Vrain. Saw a painted terrapin. Heard mockingbirds.

Back to town at 4:30 p. m. Left for La Salle on the 6:52 p. m. train. Put up at La Salle Hotel.

La Salle, Colo., Thursday

June 20, 1912.

Another bright, hot morning.

Drove west, returning at 4 p. m. and

took 5 p.m. train for Ft. Morgan. Went to Curry Hotel and called up Harry Blatworthy, who came to see us while we were at supper, arranged for him to take us out in auto tomorrow.

Ft. Morgan, Colo., Friday  
June 21, 1912.

Another bright, hot morning. The last few days have been clear, hot, with a smoky haze and clouds floating over the mountains.

We drove (per Blatworthy's auto) over to Wildcat creek, then back and up river to Orchard, crossing the river and back at Goodrich. Reached Orchard about 3 p.m. and went to hotel. Here Butters' brother came with team from Osgood to meet us in evening.

Mockingbirds at Wildcat and Orchard.  
Brown Thrasher at Goodrich.

Orchard, Colo., Saturday,  
June 22, 1912.

Clear, but hazy, warm, steady S. E.  
winds ever since Monday.

We drove east to Goodrich, then  
north to Cottonwood Springs, where  
we arrived at noon, seeing two antelope  
on the way and one hog nose snake at  
Goodrich. Then we drove west about  
12 miles to Osgood, where we arrived  
at ~~4~~ 4:30 p.m. Caught a hog nose  
snake 3 miles east of Osgood and  
a horned lizard at the spring.

Osgood, Colo., Sunday,  
June 23, 1912.

We drove S. E. about 3 miles to  
Greasewood Lake, a very shallow, subspherical  
alkali lake, <sup>in a basin</sup> probably of volcanic origin. Present  
water about  $\frac{1}{4}$  mile in diameter. Has been  
twice as great. I waded over considerable  
of it and found no life in it, searching  
especially for mollusca. Reached no

depth greater than 6 or 8 inches and Russian thistles lodged in the mud nearly all over the lake indicates no greater depth anywhere. No evidence of an outlet anywhere, so while there has been much greater depth (perhaps 4 ft.) in the past, the climate could not have been very much ~~more~~ more moist than now, or it would have formed an outlet. The drainage area is not more than a mile or so in diameter. On the shores we found many old, weathered, fragile shells of *Planorbis stirolovis*, one or two *P. parvus* and one *Physa* sp. ~~Lymnaea~~ In earth thrown from a ditch near the highest water mark all these were more abundant, besides *Lymnaea coskerelli* (or *Succinea grossenori*) and a high spired *Lymnaea*.

collected a small lizard here <sup>in this region</sup>. Saw the ~~two species~~ <sup>garter snakes</sup> collected ~~at~~ <sup>at</sup> of Plattville, one with red stripes and one with yellow.

Butters saw a bullsnake and I saw the skin of one.

Rattlesnakes reported common here.

I saw one at Crow Creek herony, about  
8 miles W. of here, several years ago.

Pleasant, cool day.

Returned at 6 p.m.

Osgood, Colo., Monday,

June 24, 1912.

Drove W. to Crow Creek at Cornish.  
Hot day. Saw brown thrushes at  
Cornish. Wind westerly.

Returned at 4 p.m. Saw dead  
rattlesnake just before we got in.

Osgood, Colo., Tuesday,

June 25, 1912.

Bright, hot. Slight west breeze.  
Drove W. and N. to Forton. Just  
before we reached Crow Creek we saw  
a hog-nosed snake - dead.

All along Crow Creek, as well as

at Bottomwood Springs, Wildcat and wherever  
we have found trees since reaching  
the Platte River, mocking birds are very  
common.

Visited the waterholes about 2 or 3  
miles above Foosston but found no  
Aphaerium and only one Physa.

Osgood, Colo., Wednesday,  
June 26, 1912.

Bright, with cool west breeze, hazy  
at a distance.

Started for Orchard by team at  
6 a. m., arriving there at 9 a. m.

Wherever ground has been plowed  
to grow up on dry-land homesteads  
and then allowed to lie uncultivated,  
sunflowers have taken almost com-  
plete possession of the soil and are  
rapidly spreading beyond the <sup>plowed</sup> cultivated  
areas, especially eastward. Between  
plowed areas there are few. In a few  
years at the present rate they will  
possess the whole land.

arrived at Orchard at 9 a.m.

Took train at Orchard at 10:50 a.m. for Hardin, where I drove out to the bluffs about 5 miles S.W., then caught the 4:53 motor for La Salle, connecting there by a 40 minute wait with the U. P. Ry. train for Greeley, arriving there at 6:30. Put up at The Campfield.

Greeley, Colo., Thursday,  
June 27, 1912

Bright and warm. Drove north and east at 7 a.m., <sup>about,</sup> returning at 11 a.m. Took 1 p.m. train for Fort Collins, where I caught the 3:15 train for Wellington. It sprinkled at Fort Collins. ~~Hot~~ Cooler in afternoon and cloudy.



Wellington, Colo. Friday,  
June 28, 1912.

Bright, very hot forenoon. Drove north about 14 miles alone, starting at 7 a. m. Cooler and partly cloudy latter part of afternoon. Returned at 6 p. m.

Wellington, Colo. Saturday  
June 29, 1912.

Another hot day.  
Left Wellington at 8:25, reached Boulder at 11 a. m.

Boulder, Colo. Tuesday  
July 9, 1912.

Cool morning, cloudy. Warmer afternoon. Norman E. Hinds and I started for Longmont on 7:50 p. m. train. Got room at Hatch Hotel.

Longmont, Colo., Wednesday  
July 10, 1912.

Bright morning. Got team from  
driery stable and started south at  
7: a. m. Drove to ~~the~~ east end of  
Gunnbarrell Hill, then east and back  
by way of Dixon Hill, arriving in town  
at 4 p. m. Hot day.

Took 5:40 train for Boulder.

Boulder, Colo. to  
Hardin, Colo.

Monday, July 15, 1912.

Hard rain yesterday.

Cloudy, misty this morning.

Left Boulder on U. P. motor car  
at 7:15 a. m., steam train out of  
Brighton at 8:57 - 10 minutes later.  
Heavy hail yesterday between Boulder  
& Brighton. Motor car out of Lea Dale  
at 9:40. Reached Hardin at about 10:10  
a. m. Notice <sup>major</sup> bridge over river at  
Kumer and Hardin - hotel and livery

at Kersey. (postmarked)

K. C. O'Dell met me at Hardin with horse + buggy. We drove east and south, (see Geol. Surv. notebook) returning to station at 4 p.m.

Saw 1 hog-nosed snake and a toad ~~at~~ S. of Lexington, on high ground.

Saw 2 ~~blue jays~~ <sup>myioquebirds</sup> and heard several yellowthroats.

Boys were catching suckers and carp in Empire ditch, from which water had been turned. O'Dell says catfish 3 or 4 lbs. in weight occur here.

Cloudy most of day. Mosquitoes bad when sun was bright at 4 p.m., above the ditch lines.

Left Hardin at 5:20 - 10 minutes late. Reached Ft. Morgan at 6:30.

Went to Curry Hotel. After supper saw Harry Blatworthy and then arranged with liveryman for team for tomorrow. Saw livery and hotel at Weldon in passing through.

Wagon bridge below Weldon.

Ft. Morgan, Colo., Tuesday,

July 16, 1912.

Bright morning, cool breeze.

Drove N. ~~then E.~~ and E. to Wildcat  
creek.

About 10 mi. N.E. saw a big  
bull snake in a cottonwood tree,  
full of food. Did not have time  
to kill him and find what he had  
been eating.

A boy with me reported seeing  
a hog-nosed snake in river bottom  
at Ft. Morgan, also a "red racer" in  
the water, with ~~long~~ red and light  
stripes - probably the gartersnake  
species I recently saw near Goodrich.  
Says "water moccasins" are common.

Mocking birds abundant on Wildcat.

Went up creek to about 15 miles  
N. and W. of Ft. Morgan, returning at  
6:15 p.m.

On bank of a dry draw 15 mi.  
N. & W. of Ft. Morgan, on E. side of  
Wildcat creek, found *Lyzumaea*

palustris and other shells, indicating  
more moist conditions within com-  
paratively recent geological time. About  
20 ft. above present drainage bed.  
saw 3 antelope on wildcat.

Ft. Morgan to Julesburg,  
Wednesday, July 17, 1912.

Cloudy, cool all day

Started to Julesburg on 11:40 a.m. train.

Noticed hotel and livery at Sedgwick,  
and hotel and auto livery at Ovid. Hoar  
at Brook where I wish to stop next  
week.

Julesburg, Colo., Thursday  
July 18, 1912.

Cloudy, cold, with E. wind.

crossed river and drove up about  
6 miles. Found *Lymnaea caperata*, *Planorbis*  
*parvus* and *Physa* sp. in a small pool.

after noon I walked down river about  
a mile. *Physa gyrina* and small *Lymnaea*  
*caperata* abundant. Collected large locusts.

Saw young killdeer swim the river.

A mourning dove flew from its nest of two eggs, then resorted to the wounded bird trick to lead me from the nest, fluttering along the ground for 400 yards before it flew back in a wide circle through the brush to its nest.

Julesburg, Colo. Friday,  
July 19, 1912.

Dr. May Ellis arrived with the fish seines and we seined the river in forenoon, also collecting Mollusca, Insects, etc. Found *Lymnaea caepurata* and *Physa gyrina* abundant and one dead *Strophitus* or *Anadonta*.

Very hot afternoon. Collected insects in afternoon.

Julesburg, Colo. Saturday  
July 20, 1912.

We drove W. to where road crosses Lodgepole creek  $\frac{1}{4}$  mile N. of Ovid.

Seined creek for about  $\frac{1}{2}$  to 1 mile  
N., also collected a garter snake, and  
some frogs and toads. Also *Physa*  
*gyrinalis* (dead) *Planorbis bicarinatus* (dead)  
*Lymnaea* (small, slender species, alive)  
*Unio* sp. (alive), many dead shells  
<sup>(more alive)</sup> of *Strophitus* or *Anodonta* (the one with  
beak ridges in simple, not double  
loop). Searched for the heavy-shelled  
*Unionidae* reported here by Simpson  
years ago but could not find even  
a fragment of one. Drove N. a mile or  
so further <sup>to the Nebraska line</sup> and searched again  
without success. A man residing  
just at the line said he found many  
of the *Strophitus* shell but never saw  
any heavy shells. A few rods  
S. of Nebraska line caught a young  
hog-nosed snake. Lodgepole valley  
is broad and shallow, in rolling prairie  
with very gentle contours. About 3  
miles W. of Julesburg I caught a hog-  
nosed snake.

Extremely hot afternoon. Returned  
about 4:30 p. m.

Julesburg, Colo., Sunday,  
July 21, 1912.

Dr. Ellis left for Boulder on  
early morning train.

Foggy morning, clearing by  
8:30 a.m. with S. wind and turning  
warm. Very hot afternoon. Spent  
the whole day at the hotel.

Julesburg, Colo., Monday  
July 22, 1912.

Bright, warm morning. Wind  
southerly. Has been southerly most of  
time since I arrived here, but S. <sup>or</sup> ~~and~~  
W. at times.

Took train for Brook <sup>over</sup> ~~and a half~~ an  
hour, late, as usual. Reached  
there at 10:00. Got a saddle horse  
at livery stable and examined the  
formations on both sides of river,  
all Tertiary. River about as at  
Julesburg. Collected *Lymnaea*



caperata in sloughs N. of town.

Got room over a drugstore and ate  
at restaurant. Extremely hot.

Brook to Sterling, Colo., Tuesday,

July 23, 1912.

Warm morning cooler toward noon  
and cloudy. Sprinkled in early afternoon.

Train to Sterling 1 hour 25 min. late,  
starting at 10 a.m.

Notice hotel at Duff as we passed through.  
Probably there is livery stable.

all along S. side of river Brule clay.  
From Sterling Grove N. about  
10 miles.

Saw hog-nosed snake about 10 mi.  
N. of Sterling.

Sterling to Merino, Wednesday

July 24, 1912

Train 50 min. late. Left at 10:10,  
reached Merino at 10:30. Hot.

Got team at livery & started up track

Went to Messey and back.

Saw Stansbury's (?) swift.

Left Merino at 5:02 p. m.,  
on time, reached Weldon in  
train at 6:15 and went to  
Hotel Manhattan.

Raining gently all evening and  
still at it at bedtime.

Weldon, Colo. Thursday

July 25, 1912

cloudy, sultry, roads windy.

Drove down river at 7 a. m.

about 7 mi. N. E. of town on open  
prairie saw lots of the big, noisy  
locusts so abundant on river  
bottom at Julesburg.

Returned at 3 p. m.

Nearly clear, bright, hot afternoon

Left Weldon at 6:10, on time,  
reached Brighton at 8:20 and went  
to Adams Hotel.

Brighton, Colo., Friday  
July 26, 1912.

cloudy, cool morning.

Out on the divide beyond the  
highest ditch small, <sup>tailless</sup> ~~toads~~ up to  
an inch in length were abundant,  
fairly swarming in places. Collected  
Physa in a ditch.

Saw a black-tailed jackrabbit.

Boulder, Colo., Monday,  
Aug July 31, 1912.

Dr. M. M. Ellis and I took 6:20 a.m.  
car to Denver and at 8 a.m. left Denver  
on D. & R. G. very hot.

Reached Glenwood Springs at  
10:20 p.m., only a few moments  
later. Went to Hotel Glenwood.

Glenwood Springs, Tuesday  
Aug July 6, 1912.

Clear and warm morning.

We went up stream to s. end of where upper pipe line crosses river, on blocks 5-1 and 5-2 where Dehan collected *O. rookshii gabbiana*. Here we found nothing but gabbiana. Then went N. E. perhaps 200 yds. to limestone, probably carboniferous, where Bethel collected *O. haydeni* and *O. gabbiana*, and here found haydeni as he did on the limestone of the lower slope.

Everywhere we found them <sup>snails</sup> under amelanchier, oak, skunk bush, cherry and other bushes, each snail being attached to a leaf.

Up hill the haydeni played out in about 200 or 300 ft. Then we got abundant <sup>dead</sup> ~~hay~~ gabbiana, a <sup>very</sup> few of which aline with depressa, we found with haydeni. Found three sinistral shells in travelling

about 100 ft. up hill, and 2 more dead  
one and 2 live ones 100 ft. further  
up, where dextral specimens were  
very abundant alive, on mixture  
of fragmentary sandstone and  
limestone. *O. gabbiana* colony ~~was~~  
on dry hillside, while *haydeni* in  
~~was~~ more moist situation in gulch.

Both species were under accumula-  
tions of leaves at the down-hill base  
of shrubbery, where they were protected  
by shrubbery from the wash of  
storms. *Haydeni* was invariably attached  
to a rotten leaf, but *gabbiana* less  
often so. Found none of either sp.  
under rocks. None of the *haydeni*  
are heavily lined with raised spirals,  
all rather small and high spired.

Afternoon we visited the limestone  
across the river just above the N. end  
of the pipe bridge, opposite the *haydeni*  
locality visited this morning. Here  
in rock slides mixed with leaves and  
humus, below oak, shrub bush, *Quercus*  
etc. and clinging to rocks, not to

leaves, we found big, flat hayden  
with very strong raised spiral ribs.  
Evidently we have on opposite sides  
of the river two distinct forms of  
hayden between which the river  
forms a complete barrier. The  
river is about 175 ft. wide (estimated)  
and swift.

Found no gabbiana N. of river.  
Sapan and Bethel agree with us on  
this.

• A small gabbiana dropped  
on the carpet in my room  
crawled  $2\frac{1}{2}$  ft. over the dry,  
rough carpet and was still  
crawling when discovered, losing  
a great deal of shine in the  
process and leaving a plain  
trail of shine behind him.

Grand Junction, Colo.

Wednesday, ~~July~~ <sup>Aug</sup> 7, 1912.

Left Glenwood Springs at about 8:30<sup>a.m.</sup>, nearly on time.

At Rifle are permanent sloughs which should be examined for fish, reptiles, amphibians, mollusks, crustaceans, etc.

Reached Grand Junction at 11:40. Went to St. Regis Hotel.

In afternoon seined Grand River and adjacent sloughs. Obtained about a dozen species of fish, several mollusks, etc. River high, bottom mostly rocky, current swift.

Montrose, Colo., ~~Aug~~ Thursday  
Aug 8, 1912.

Left Grand Junction at 8:35 a.m.

Reached Montrose at 12:20 noon.

Went to Gladstone Hotel.

In afternoon we drove south

about six miles up Spring Creek,  
then across to the Uncompahgre,  
down the latter to town.

Collected a few mollusks,  
butterflies and crustaceans.

Along the Gunnison <sup>and Uncompahgre</sup> from Grand  
Junction to Montrose the Triassic?  
to Dakota section is about as in  
the Livermore Quadrangle - the  
brick red soft material abruptly  
gives way to massive, harder,  
light red sandstone, overlaid by  
the less massive s. s., shale and  
l.s. of the Morrison.

Montrose, Colo. Friday.  
Aug. 9, 1912.

Bright morning.

Scimed Uncompahgre river and  
Happy <sup>Gunnison</sup> Creek. Got fine lot of fish  
and a few mollusks. Saw Coon tracks  
at Happy <sup>Gunnison</sup> Creek.  
Took 2:35 P. M. train south.



Reached Telluride at about 8: p. m.

Most of way was through canyons with walls of Dakota s. s. and Morrison, occasionally red beds exposed below. Toward Placerville got well down into red beds, with one band of coarse conglomerate.

Section about as from Boulder north. Morrison abruptly passes into Lower Dakota <sup>massive</sup> s. s., then less massive s. s. and shale, then massive upper s. s.

Several places showed soft <sup>deep</sup> red "Lynchies" passing abruptly into light red then white massive s. s. as ~~at~~ in Livermore quadrangle, this noticed on the Uncom-  
pagre both above and below Montrose.

After passing Ridgway we crossed a divide probably over 9,000 ft. high, as indicated by vegetation, and with abundant aspens, then went down a canyon rapidly, then up through Placer-

ville and left main line at  
Vance Junction.

aspens abundant on S. side  
of canyon at Telluride, less so  
on N. side. Red beds on both  
sides.

Telluride, Colo., Saturday  
Aug. 10, 1912.

44° above zero at 6:30 a.m.

Left Telluride at a little after  
7 a.m., a few moments late.

about at Ophir we passed into  
igneous rocks. On approach to top of  
the divide we found coarse conglomerate.  
On approaching ~~the~~ we pass much  
red beds and conglomerate. about 1 1/4  
hr. after leaving Ouray noticed abrupt  
contact of soft, deep red "Lykins"  
with lighter colored, harder, massive  
s.s. above as at Livermore <sup>Donastrapp</sup>  
showing for several miles.

as we approached Dolores for several

miles the lower slopes of the canyon walls were Morrison, with Dakota at the rim. Toward Mancos the Mesa Verde occurs, bearing coal, with Mancos beneath. The same is true of Durango.

Reached Durango at 4:25, on time.

a big field of snow on <sup>E. side of</sup> Mt. Wilson may be a glacier, but is covered with snow so that if so it did not show.

Durango, Col., Sunday,  
Aug. 11, 1912.

Cold morning, hot at noon. We examined Junction creek and Florida. Suckers abundant at latter place.

Durango, Col., Monday,  
Aug. 12, 1912.

Left Durango on 8 a. m. train. Near Lizard's Head, at about 9,500

7<sup>th</sup>, train was delayed for half an hour or more by a wreck, and under aspens we collected

*Pupilla* sp.                      *Vertigo* sp.  
*Vitrea alaskana*              *Oriohelix* sp.  
*Encornulus alaskensis*      *Thyranophora infernali*

Rained at intervals

Reached Telluride at ~~6:20~~ 6:25 p. m., and in a few moments collected, under aspens south of creek:

*Agriolimax campestris montana* (small black form)  
*Valvonia* sp.                      *Pupilla* sp.  
*Encornulus alaskensis*      *Vertigo* sp.  
*Thyranophora infernali*      *Oriohelix* sp.  
*Vitrea alaskana*

Telluride, Colo., Tuesday  
Aug 13, 1912.

Took 7:30 train north.

Contact of soft, red Lyons with overlying harder, lighter colored S.S. and Morrison and Dakota

above, well exposed in cliffs between Vance Junction and Placerville. Mansos Well exposed at Ridgway.

Below Gunnison broad, flat meadows with many sloughs and narrow-leaved cottonwood groves. Good sloughs and aspens near Sargent, where there is a small hotel.

Nederland,  
~~Idaho~~, Colo., Thursday,  
Aug. 29, 1912.

Left Boulder on Hitchox & Fields' auto-stage at 9:45 a. m., reaching Nederland at 11:00. Mr. & Mrs. A. E. Collins came up on afternoon stage. Very hot in Boulder, cool in afternoon at Nederland.

Nederland, Colo., Friday,  
Aug. 30, 1912

cloudy, cool forenoon. I collected Mollusca (*Pyramidula*, *Limnoides*, *Velonia*,

Encyonurus, Vitrea, ~~Pupa~~ Pupilla, Vertigo)  
in aspen grove. Also one fine water  
snake on hill 1/4 mile from water  
and 250 feet higher than creek.

Nederland, Colo. Monday,  
Sept. 3 → Aug. 2, 1912.

P. G. Woodruff and I left Nederland on  
horseback at 6:45 a.m., passing through  
Baribou. Reached the saddle at 10:45.

Went down on glacier. Very much more  
snow ~~was~~ all about than usual. Saw some  
below Baribou. Crevasses and bergschrund  
opened but little. Passed up over the glacier  
and climbed west wall of the cirque, then  
to top of ~~the~~ North Arapaho.

Very little water in the Terminal  
lake.

Position of front unchanged.

Another terminal lake starting  
west of old one, showing recent  
shrinkage there.

Boulder, Colo., Sunday,  
Apr. 13, 1913.

Left Boulder on Interurban at  
5:30 p. m. Left Denver on D. & R. G.  
at 9 p. m. Hot, bright day.

Leadville, Colo., Monday,  
Apr. 14, 1913.

Reached Leadville at 8:20 a. m.  
Got room at Vendome Hotel and  
breakfast at King's Cafe. <sup>Principal</sup>  
Met Supt. S. L. Stouffer and, <sup>Lula</sup>  
M. Pinger at High School; also Salita  
Bell, Marie Waltemeyer and other friends  
who are teaching in the grade and high  
school, and Judge Bavendick, president  
of the school board. Visited all the  
schools and several classes, at  
2:30 p. m. I spoke to the senior  
class, at 3:30 to the whole high  
school and at 4:30 to all the  
teachers of the town. Dined at  
6 p. m. at home of Supt. Stouffer.

at 8 p. m. Clarence J. Hersey called on me at the hotel and we had a long visit.

Leadville, Col. to  
Gypsum, Col., Tuesday,  
Apr. 15, 1913.

Left Leadville on D. & R. R. at 4 a. m.

Left Malta at 6 a. m. - cold and clear.

Reached Gypsum at <sup>about</sup> 9 a. m.

At Wolcott the Niobrara, Benton and "Dakota" are well exposed, rather flat for several miles. Up river we ran through red beds. Down river we ran into Morrison, then below this massive salmon and whitish s. s., underlain by soft red shales as ~~at~~ Owl Canyon, N. W. of Ft. Collins.

About or below Eagle began to find heavy gypsum deposit and some volcanic material.



folded and faulted.

at Lyppan the gypsum is thick, the volcanic conglomerate of well worn s.s., l.s., etc. and vesicular ~~to~~ basalt, bound by a volcanic ash cement, hangs on the walls of the canyon as if it had once filled the valley, but had mostly been eroded away. Principal J. H.

Supt. Richard met me at the depot and took me to the County High School. There I talked to the whole school, to the senior class and to the Geology class during the day.

at 4 p. m. we went for a walk.

a boy (Glover) showed me two specimens of *Orschelia strigosa depressa* from this region (dead), and I saw *Physa* sp. (small, perhaps young) in a small stream between town and school.

Glenwood Springs, Colo.,  
Wednesday, April 16, 1913.

Reached here at 8:15. Called on  
Supt. John Girdley, and Arthur J. Couray,  
talked to the <sup>High</sup> School, then to the  
senior class, visited classes and met  
Adelaide Moyer. In afternoon spoke  
to the geology class on the Snail  
colonies of Glenwood Springs, Colo.  
Warm, bright day. At 4 p. m. Couray  
and I climbed the hill where Ellis  
and I found *Orskehix hendersoni* last  
summer and found two more  
sinistral specimens, which I gave  
to Couray. Dined with Supt. Girdley  
and family at 6 p. m., returning to  
hotel at 9 p. m.

Carbondale, Colo., Thursday  
apl. 17, 1913.

Left for Glenwood Spr. at about  
10:20 for Carbondale, where I visited  
the high school and next met

7 dupl.

Principal, A. C. Johnson; also Miss Shemate; both former students of the University. Dined at noon with Johnson. In afternoon I talked to the High School, then to the senior class, then to the 8<sup>th</sup> Grade class in agriculture under Mrs. George S. Osborn<sup>urn</sup>.

Just after leaving Glenwood the dips of the red beds are ~~to~~ southerly, then change to easterly or northeasterly. Further S. the thick gypsum deposit occupies the valley and lower slopes or bluffs. Good agricultural valley. Hills covered, usually sparsely, with cedars and piñon pines.

Cloudy afternoon, raining at dusk.

Left for Basalt at 8 p.m. on Colo. Midland Ry., going to depot, a mile or two from town, on stage.

Basalt, Colo., Friday,  
Apr. 18, 1913.

Still partly cloudy, cool. Good mountain hotel, trout for breakfast.

Left ~~on~~ on Colo. Mid. Ry. at 8:30 a. m., sprinkling.

Got into red beds a short distance dipping E., then into typical Morrison and "Sakota", at Watze's. Further up are several hundred feet of Mancos shales and lime bands, well exposed in steep slopes.

Reached

Aspen, Colo., Friday,  
Apr. 18, 1913.

Reached here at 10:15 a. m.

Talked to High School at 11 a. m. and then to Senior class. At 3 p. m. addressed teachers of grades and high school. Rained in early afternoon.

Left Aspen on D. & R. V. at 4 p. m.

"Sakota" Morrison and Maxson  
well exposed about 2 to 4 miles  
below Aspen.

Reached Glenwood spr. 7 p.m.

Glenwood spr., Colo.

Sat., Apr. 19, 1913.

Left here at 4:20 ~~p.m.~~ a.m.

Reached Boulder at 5:30 p.m.,

and Boulder at 6 p.m.

University account

# Geological survey account

20

June 3. Anti-venomous serum <sup>aberrant</sup> <del>7.50</del>	5.00
6 Fare Boulder - Denver	.90
" Manhattan restaurant " dinner	.25-
7 breakfast at Salda	.55-
<del>" " Bon Air coffee</del>	<del>10.00</del>
" 6 " Hinds	10.00
22 days in June	110.00
June 8. E. H. Garrett, Mouthrose, stoop pipe	.90
" 12. Standard Chemical Co., Naturita, one 2 1/2 gal water bag	.90

Boulder, Colo. June 6, 1914.

Left with geological survey party  
at 4:20 p. m. Left Denver at 8 p. m.

Salida, Colo., June 7, 1914

Reached here at 5 a. m., half  
hour late. Left over narrow gauge  
at 6:30.

Montrose, Colo. June 7, 1914

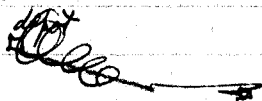
Reached here at 2:30 p. m. <sup>Phil</sup> Worcester  
met us at depot. Horses and outfit not  
yet here. Rained in afternoon. Phil  
and I went to look for Bethel's fine  
*Orchelimum* colony but did not find it.  
Put up at Belvedere Hotel. Rained at  
intervals during afternoon.

Montrose, Colo., June 8, 1914.

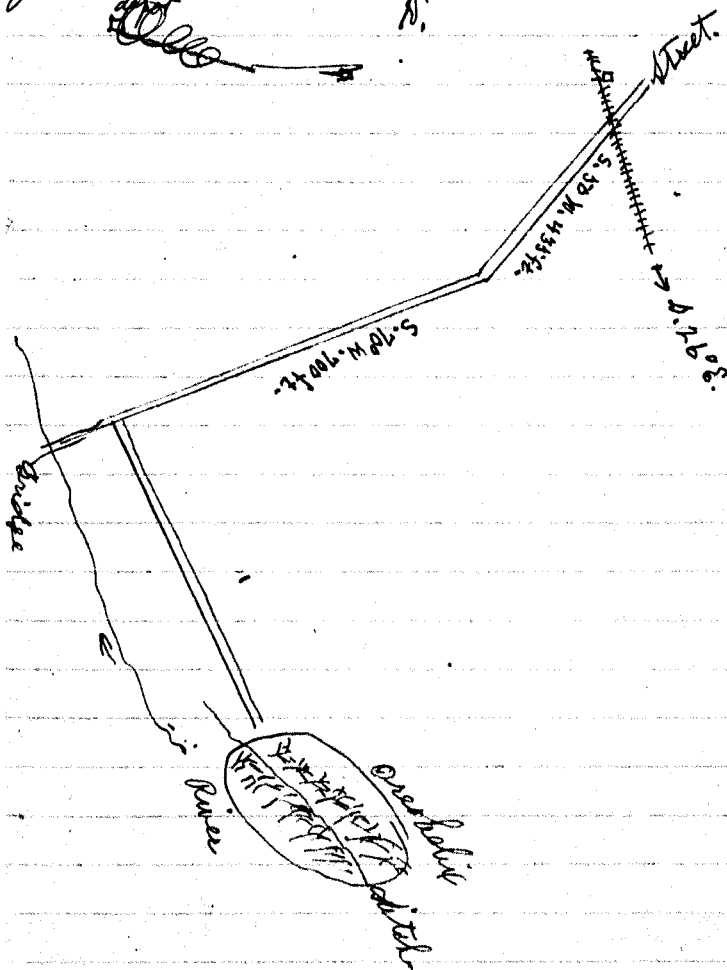
Partly cloudy forenoon. The boys  
loaded three cars in forenoon, while  
I went to hunt Bethel's snail colony,  
and collected a bottle of *Orchelimum* cf. *cooperi*.



in grass mostly, under rose bushes  
and willows covered by *Clematis ligustici-*  
*folia*?



N.



Left Nantrose by rail at 2:55 p.m.

Placerville, Colo., June 8, 1914.

~~Reached~~ Reached Placerville at about 6:30, 20 minutes late, and all went to Mineral Springs Hotel. On train was Chas. Knous, who owns a coal mine N. of Kucha, about 6 mi. N. of Naturita.

Placerville, Colo.

Tuesday June 9, 1914

Got started from Placerville about 1:30 p.m., with 2 wagons and four men on horseback. Phil Worcester, Blair <sup>and Rex</sup>, Coffin, <sup>and I</sup> rode up a gulch and examined Dolores and lower La Plata formations, two wagons going on ahead, camping about 12 miles down the San Miguel, at the bridge. We collected dead *Oreohelix* cf. *strigosa depressa* under rocks but found no live ones. Hot, bright day. Rode horseback all afternoon.

Norwood, Colo., June 10, 1914.

Big pull out of canyon just after leaving bridge. In canyon were narrow leaved cottonwoods, <sup>yellow</sup> pines, etc. On mesa, piñon pines, cedars and big sage brush. Reached Norwood about 10 a.m., six miles from river. Got back to San Miguel river at Naturita, camped by river. Bright, hot day. Rode horseback all day.

Naturita, Colo., June 10, 1914.

Worked in bluffs about here on stratigraphy. Very hot. Got a bull snake on the mesa - 5-ft. 8 $\frac{1}{4}$  inches. Black Coffin brought in a small rattlesnake and Frank Rohrer got three lizards. Ballared lizards common.

Naturita, Colo., June 12

Mostly clear, warm. Went up Basin Creek (Dry Creek). Saw

broad-leaved cottonwoods, as well as narrow-leaved.

Cottontails and rock squirrels abundant. Above camp saw antelope squirrels yesterday.

Ark. or Cassin Kingbird (the one with white outer tail feathers common)

Mourning dove common

Lark sparrow abundant

Swainson hawk - 2 young leaving nest yesterday, adults screaming overhead.

Ravens, 2 yesterday

Pinon(?) jays heard on mesas

Meadowlark common

Barn swallow.

Canyon wren heard at head of Paradox Valley.

Yellow shafted flicker common

Hummingbird common

Mockingbird occasional

Brewer's Blackbird common

Yellow warbler

Naturita, Colo. June 13, 1914.

J. A. Pynch and I examined the formations along Basin Creek and collected *Gryphaea newberryi* from the Mancos formation. Saw sage brush 12 ft. high. A very hot day.

<sup>Sunday</sup>  
Naturita, Colo., June 14, 1914.

Partly cloudy and very sultry and hot. Collected *Oreohelix cooperi*, *Vitrina alashana*, *Pyramidula c. authouxi*, *Louitoides arboreus*, *Vertigo* sp., *Encornulus* etc. under cottonwood logs a mile or so below camp.

Naturita, Colo., Monday,  
June 15, 1914.

Went up Basin Creek again  
Canyon wren heard in two places.  
Saw big deer tracks - doubtless a mule deer, fresh and numerous.  
Saw one bull snake and Frank Rohwer took one. Colored lizards common.  
Bright, hot.  
Red-tailed hawks nesting at Coke ovens.

Naturita, Colo., Tuesday,

June 16, 1914.

Went up Basin creek again. Hot, bright.

Naturita, Colo., Wednesday,

June 17, 1914.

Worked on mesa N. of Naturita nearly to Kuela. Few pinons or cedars on flat top of mesa - confined to draws and slopes. Hot, bright. Moved camp to old coke ovens, at Standard Chemical Co.'s headquarters, on Basin creek, about 4 miles W. of Naturita. altitude 5,500 ft.

Saw Western yellowthroats near Naturita

Coke Ovens, Thursday,

June 18, 1914.

Hot and bright. Rode up Basin creek. Cottontail rabbits very abundant.

Saw two long, striped lizards with long tails.

Lake Owens, Friday

June 19, 1914.

Cloudy forenoon, partly cloudy afternoon, cooler, sprinkled in forenoon.

Clare Coffin and I went up Basin Creek canyon some distance, then climbed the canyon wall on S.E. side of canyon.

Woodchucks heard up canyon and at camp. Had 7 rabbits for dinner.

Lake Owens, Saturday

June 20, 1914

Clare Coffin and I rode into Paradise valley and along the N.E. wall on the Boy Park road for several miles, then crossed the valley, thence back to camp. Cool, windy, cloudy, sprinkled.

Sunday, June 21, 1914.

Hot in sun, windy, stayed in camp all day. Goat bites terrible.

Cake Oven,

Monday, June 22, 1914.

Rode up Basin creek. Hot, bright sun, but wind cool. The broad-leaved cotton-woods here, not same as east of Rockies - have leaves narrower in proportion to length, about thus:  $\text{O}$

Cake Oven, Tuesday,

June 23, 1914.

Rode into Paradox Valley and along the north wall of the ~~two~~ valley.

Hot in sun - good breeze on all open points tempered the heat.

Cake Oven, Wednesday,

June 24, 1914.

Moved camp, going to head of Paradox Valley and then along the road which follows the inclined plane of the La Plata sandstone up to an altitude of 6,400 ft., at the head of Long Park, at Will Marth's camp where there is a fine



Spring, Hot and bright,

Long Park, Thursday,

June 25, 1914.

Hot and bright. The Park is a grassy meadow - grass very scant, surrounded by hills and cliffs covered by junipers and cedars. Phil Worcester returned to the party in the evening. I found two good springs in a deep canyon, very rugged.

Long Park, Friday,

June 26, 1914.

Hot, bright until 4 p.m., then cool breeze came up. Saw several ravens. Frank Rohrer has noted Turkey vultures in several places. I have seen none. Lizards not so plentiful here as down in the valley and have seen no collared lizards here.

Long Park, Colo., Saturday

June 27, 1914

Bright, hot. I started on horseback for southern survey camp (Coffin's party) at waterholes <sup>at stone cabin</sup> near Young's ranch at 7:30 a.m. Reached foot of Long Park hill at 9:45 and entered mouth of Basin creek canyon south of Lake Ovens at 11:15. Stopped for lunch at 11:45. Saw a coyote. Reached camp at 4 p.m.

Stone cabin, Basin Creek,

Sunday, June 28, 1914.

Hot, bright, little breeze. Stayed in camp all day.

Stone cabin, Monday,

June 29, 1914.

Hot, bright, quiet forenoon. Rode S.W. across the basin. Basin occupied by

Maneas shales, no trees. Trees on rocky ledges all around the basin - fir, spruce & cedars. Cooler, breezy, cloudy afternoon.

Stone Cabin, Tuesday

June ~~29~~ 30, 1914.

Spent day at head of Gypsum creek. Rained from noon to 3 p. m. Cool evening. Saw Say's Phoebe

Stone Cabin, Wednesday

July 1, 1914.

Rained again during night. Cool, partly cloudy morning. Rode to Basin-Gypsum divide again. Saw Say's Phoebe.

Stone Cabin, Thursday.

July 2, 1914.

Rained hard all night. Roads too heavy to move today, so we rode to head of Gypsum and thence into Disappointment.

Gypsum Creek, Friday,

July 3, 1914.

Moved camp to mouth of Gypsum Creek on Dolores river. Enormous changes must be made in the geologic map of this region. It is not even approximately correct.

Saw several Say's Phoebes at head of Gypsum.

Pinon jay everywhere abundant

Ravens 3, 3 miles above camp.

Meadowlark common at camp.

Yellowthroats " " "

Lark sparrow the most abundant bird in the region unless it be the Pinon jay, the latter, however, being found in the trees, the former in the treeless valleys.

Began raining at noon and rained all afternoon. Cleared in evening. Clare Coffin did not get in.

Gypsum Creek, Saturday

July 4, 1914.

Rained again at daylight.

Clare not in yet at 7 a.m. Saw a fire on precipice east of camp last night which was likely his fire.

Heard canyon wren on canyon wall.

Clare returned to camp at about 9 a.m.

I rode along foot of N. precipice of Gypsum Valley, examining contact of Dolores formation with the gypsum.

Rained furiously at times during afternoon, with some hail, continuing to late evening.

Gypsum Creek, Sunday,

July 5, 1914.

Hot, bright most of day. Rained a little in afternoon.

Mockingbirds and orioles singing in the broad-leaved cottonwoods along the river, a few willows here also.

~~Now Robins down river.~~

Gypsum Creek, Monday,  
July 6, 1914

Hot, bright, scarcely a cloud in the sky. I rode up creek about 9 miles along the Carboniferous?-Triassic contact.

Gypsum Creek, Tuesday,  
July 7, 1914.

Hot, bright morning. Not a vestige of a cloud in sight. Saw robins down river. Have seen two collared lizards here. Nowhere have I seen them as plentiful as in the canyon south of Lake Owens on Basin Creek. Hot and bright all day. Took a bath in the <sup>colours</sup> river.

Gypsum Creek, Wednesday,  
July 8, 1914.

Another bright, hot day. Saw a red-winged blackbird in the river bottom this morning. I rode s. into Disappointment Valley.

In a <sup>dry</sup> gulch I found some large yellow pines, some on higher ground. One measured exactly 12 ft. in <sup>circumference</sup> ~~diameter~~ a foot above ground - above the swell.

Rained in afternoon

Moved camp about half mile up river for better camping ground.

Gypsum Creek, Thursday.

July 9, 1914.

Partly cloudy most of day, but hot. I rode over into Disappointment basin. Got water for horse in creek at 1 p.m.

Gypsum Creek, Friday.

July 10, 1914.

Partly cloudy all day, but hot when sun not covered by fleecy clouds.

Spent the day working on complex jobs about camp.

Gypsum Creek, Saturday.

July 11, 1914.

Very hot day, some fleecy clouds.  
I rode about 7 miles N.W. Got a  
very fine view of the magnificent  
canyon of the Dolores. Forded  
the river in two places - about  
100 ft. wide and 2 ft. deep.

Gypsum Creek, Sunday

July 12, 1914.

Hot, bright forenoon, cloudy afternoon  
sprinkling at intervals. In camp  
all day. ~~Rained at dusk and late~~  
~~into night~~

Gypsum Creek, Monday

July 13, 1914.

Worked with Clarence Copping in  
formations along N. side of valley.  
Very hot day. We bathed in



river on return to camp. It  
sprinkled in early evening and  
was raining at bedtime.

Gypsum Creek, Tuesday,  
July 14, 1914.

Cooler, sprinkled in early evening.  
I climbed N. wall of canyon and  
worked on Dolores - La Plata contact.  
Killed another rattlesnake near camp - same  
species that we have collected.

Colored lizards fairly common hereabouts  
saw Mt. bluebird in cliffs

House finches in bottom lands and  
on Dolores canyon cliffs

Magpies common along river.

Yellowthroat most common bird in  
river bottom, piñon jay on high ground  
where piñons <sup>are</sup> abundant.

scrub oaks, broadleaf cottonwoods,  
willows and shunk bush in bottom lands.

River high and very muddy tonight.

Gypsum Creek, Wednesday,

July 15, 1914.

Bright, hot morning.

saw toadpoles in bottom lands.

Night-hawks common.

Found <sup>dead</sup> *Succinea avara* sparingly on  
arid slopes, & one day found one small  
live one in river bottom.

In fine debris under bushes up  
river a mile I got a few *Pyramideles*,  
and a lot of *Valoniinae*, *Pupilla*,  
and *Vertigo*, all dead. Got two paper  
bags full of the debris to be sorted  
over.

Gypsum Creek, Thursday,

July 16, 1914.

Hot forenoon, cloudy, cool breeze and  
sprinkled at intervals in afternoon.  
The whole party went with pack  
horses to Bull Canyon except me.  
I worked up along N. side of

Gypsum Valley for some distance.  
Had stomach ache all day. Reached  
camp at 7 p.m., made Erbwarst  
soup for supper. It made me  
worse.

July 17, 1914.

Gypsum Creek, Friday.

cloudy, cool, all day, sprinkled at  
intervals. Was sick all night. Stayed  
in camp today. Ate some crackers  
and salmon - a small amount - at 1 p.m.  
Ashley returned in afternoon and got a  
good supper of nicely fried ham, toast  
and cocoa. I ate some and feel all right  
now.

Gypsum Creek, Saturday.

July 18, 1914.

cloudy, <sup>and</sup> cool all day, sprinkling at intervals,  
raining in afternoon. I collected ~~f~~  
carboniferous fossils along N. side of  
Valley all day.

Ashley started to Horwood in the morn-  
ing for oats, etc.

Hinde, Graves and Heaton returned from Bull Canyon in evening, leaving Clara boffin there.

Gypsum Creek, Sunday,

July 19, 1914.

Cloudy morning, partly clearing by 10 a.m. Hinde and Heaton went back to Bull Canyon.

Gypsum Creek, Monday,

July 20, 1914.

Graves and I went to Bull Canyon with a pack horse loaded with provisions and oats and hay. I returned to Gypsum at 8 p.m. and found Ashley here getting supper. Rained upon the bluffs, but not here in afternoon, forenoon hot.